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Report No. 15



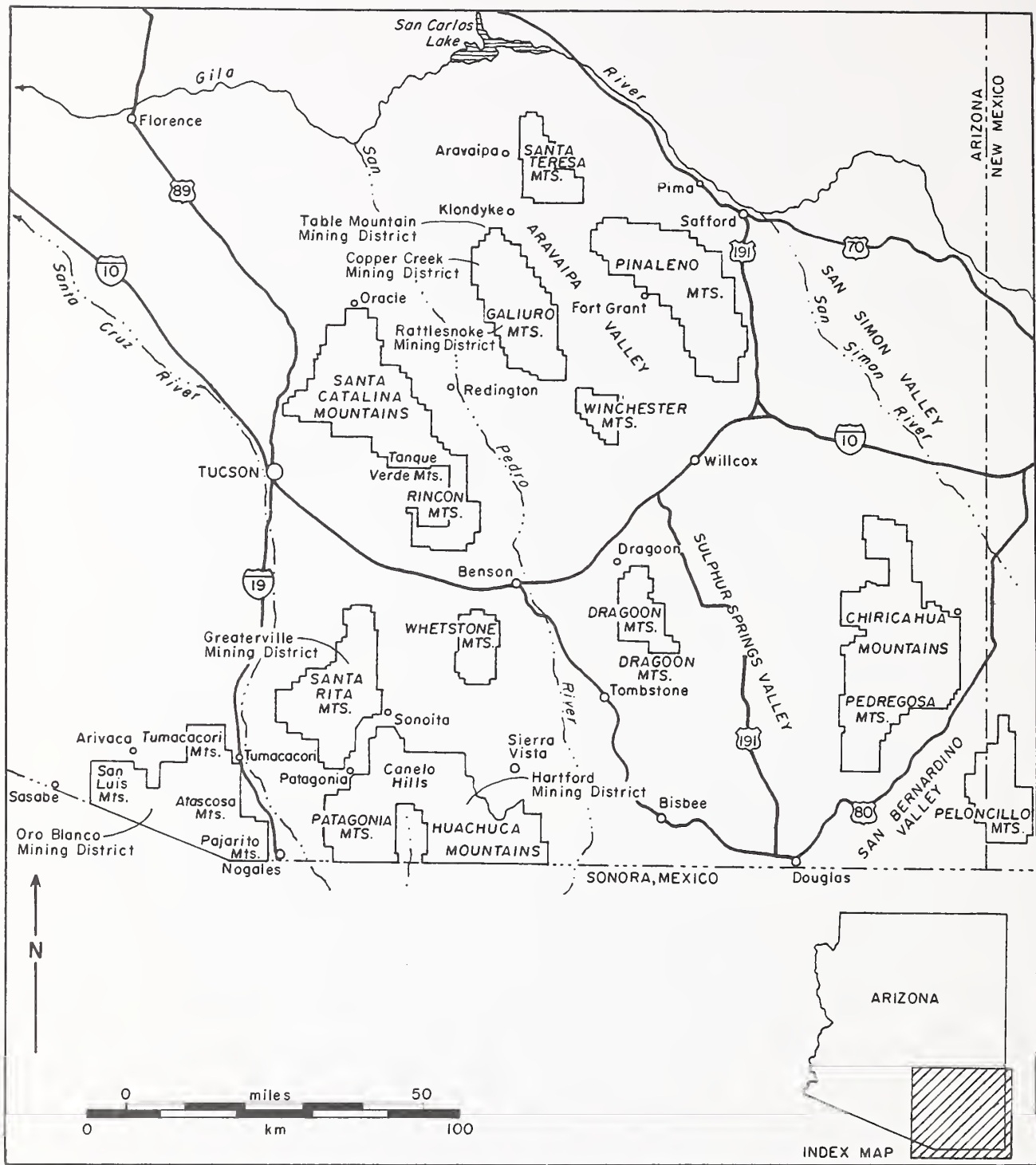
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Tearing Up The Ground With Splendid Results: Historic Mining on the Coronado National Forest

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Frontispiece. Major mountain ranges and selected mining districts of the Coronado National Forest.

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Tearing Up the Ground With Splendid Results: Historic Mining on the Coronado National Forest

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**Heritage Resources
Management Report No. 15**

**USDA Forest Service
Southwestern Region**

September 1995

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The lure of mineral wealth has drawn Euro-Americans to the Southwest since 1539, when Fray Marcos de Niza pioneered a route for Francisco Vasquez de Coronado. Fray Marcos, Coronado and their retinue of 1,100 Spanish and Indians were searching for the legendary golden cities of Cibola. They found instead the pueblos of New Mexico, which held no gold. While Coronado's expedition gave the Spanish valuable information about the region, disappointment over the lack of gold delayed colonization for years.

In Arizona, missionaries such as Father Eusebio Francisco Kino were the first to return. But it was the discovery in 1736 of *planchas de plata* (slabs of silver), at "Arizonac," southwest of modern Nogales, that led to the first significant Spanish settlement. Ultimately, the discovery provided a name for the state.

Similarly the 1856 re-opening of Spanish silver mines near Tubac, by the Sonora Exploring and Mining Company, marked the beginning of substantial Anglo-American settlement in Arizona. Mining dominates the history of the following decades, with rich gold and silver discoveries along the Colorado River, and a Tombstone bonanza that has proven an equally rich "mine" for Hollywood. By the 1880s, copper mining surpassed gold and silver in importance, and led to the founding of Jerome, Globe, Clifton, Bisbee and Ajo. Today, mining remains a cornerstone of the State's economy and culture.

It is therefore fitting that the Coronado National Forest, which derives its name from the first Spanish gold-seeker, has compiled a volume of reports devoted to mining. The Forest's mining resources present a broad spectrum. Chronologically, they span the range from pre-Gadsden Purchase Spanish and Mexican mining, to contemporary prospecting. In addition to gold and silver, the minerals sought include less-glamorous metals such as copper, lead, zinc and tungsten. The technologies represented range from simple panning to complex and dangerous smelting and cyanide treatment.

Evidence of mining abounds on the Forest. Resources range from barely-noticeable artifact scatters, representing encampments of the hand-laborers who extracted ores at little financial and great physical cost, to smelters foundations, slag heaps and cyanide leaching tanks representing the apex of historic energy and chemical technologies. Most numerous are adits (usually called tunnels) and shafts. Less common are the smelters, and the log, frame and adobe cabins and offices of the more fortunate laborers and mine managers.

The mountains of the Coronado are among the best areas to explore and interpret the many facets of mining in the American West. John P. Wilson begins the

task with an overview of the Coronado's place on the mining frontier. He calls attention to the tendency for most mines to exploit the pockets of investors as often (or more often) than they exploited pockets of ore. The key to success was access to capital, cheap transportation, and beneficial market conditions. The importance of the subjugation of the Apache and the construction of the Southern Pacific Railroad to the development of the Coronado's mineral resources is apparent. Wilson describes the many spectacular failures, and rare successes, that make the Coronado's mining history a rich source of archeological and historical data.

Farrell and Spoerl outline a research and management framework for "mining" the data and giving it meaning. Drawing from Donald Hardesty's (1988) work on Nevada mines, they outline themes and property types that allow the study of mining resources to go beyond description to explanation, and provide for interpreting the results to the public.

The balance of the chapters present case studies in the application of Wilson, Farrell and Spoerl's themes. Wilson presents a brief history of the Galiuro Wilderness, whose mining ventures are among the more colorful elements of the Forest's history.

Bill Gillespie provides a history of mining at the Carr Canyon Reef in the Huachuca Mountains. Activity at "The Reef" spans the transition from exploitation of gold and silver to extracting base metals, in this case tungsten. The influence of outside market forces on the character and pace of mining is clearly illustrated in the history of tungsten production at "The Reef."

McDonald, Gillespie and Farrell describe Kentucky Camp, one of the Forest's best-preserved mining sites, located in the northern Santa Rita Mountains. Containing placer tailings from late nineteenth-century gold mining, and a water system and buildings from early twentieth-century hydraulic mining, the site illustrates the increasing importance of capital and professional management in the development of the Forest's mineral resources.

A newspaper account of the hydraulic mining at Kentucky Camp described the operation as "tearing up the ground with splendid results," reflecting the enthusiasm which characterized local mining ventures. However, the results were frequently less than splendid, as pockets of rich ore were quickly exhausted, or were revealed as merely the product of a promoter's imagination. Splendid or not, the results remain with us, stimulating curiosity as to their origin and history. We hope to satisfy this curiosity through interpretation of mining history in this volume.

The Coronado is also pleased to be interpreting mining history through projects in addition to this volume.

Wilson's chapter is available as a brochure, interpreting the history of a designated Wilderness, where on-site interpretation is discouraged. The history of The Reef is incorporated in an interpretive trail at Reef Townsite. Kentucky Camp has been the site of several Passport in Time projects, and interpretive signs have been installed along portions of the Arizona Trail lying within the site.

Such projects are just the beginning, however. We hope that this volume will increase knowledge of the research and interpretative potential of the Forest's mining resources, stimulate discussion, aid in new investigations and assure expansion and improvement of interpretation.

Mining in the Forest

Mining and prospecting are permitted on the national forests. The only restrictions are that mining laws and regulations shall be complied with and that mining claims must be held in good faith as legitimate mineral developments. Mining in the forest gives work to local people.

Mining is a leading activity in Arizona and has been since the date of the Gadsden Purchase. Innumerable mining claims have been filed in the Coronado National Forest, and much wealth has been produced by the mines.

W.F. Cody, better known as Buffalo Bill, owned the Hi-Jinks gold mine and the Camp Benito Scheelite Mine, both of them located in the Coronado Forest. The Phelps Dodge Corporation, the American Mining and Smelting Company, and the Magma Company, are among the larger producers having holdings within the forest.

The forest furnishes about one-fifth of all the metals processed by a customs [sic] smelter in El Paso, Texas. It uses copper, lead, silver, and gold. The zinc is re-shipped to the smelter at Amarillo, Texas.

The lead is shipped to Omaha, Nebraska, where it is processed into storage batteries, alloys, pipes, and a base for paints. The copper from the El Paso smelter is shipped to Baltimore, Md., and Perth Amboy, N.J., where it is refined into cathode sheets. These are shipped to manufacturers all through the East, where they are made into copper pots, pans, wire, electrical equipment, and hundreds of other things. Thus, the products of the Coronado National Forest stimulate industry over a far-flung area.

Source: *The Roots Spread Far*, n.d. (circa 1941) Coronado National Forest folder (mimeograph), USDA-Forest Service, Southwestern Region.

American adventurers began exploring southern Arizona even before the United States took possession of the Gadsden Purchase. The rediscovery of old Spanish and Mexican mines led to a brief mining boom, cut short by the Civil War. Mineral interests at this time, between 1857 and 1861, centered on the silver-lead prospects in the upper Santa Cruz and Arivaca Valleys. After the Mowry mine closed in 1862, Arizona south of the Gila River saw only limited development until the late 1870s. Mining resumed around 1878 and prospered for 15 years, spurred by the remonetization of silver. Activity in the 20th century has been greatest in times of high metal prices and emphasized the base metals -- copper, lead, zinc. By the 1970s increasing costs and the depletion of ore bodies had caused most mining to suspend, although several major copper-producers are in operation today.

HOW TO PROMOTE A MINE, or FINDING PAY ORE AMONG THE CLAIMS

A history of mining has inherent problems. For one thing, the usual practice of relying on contemporary or primary sources turns topsy-turvy. These sources are often suspect since mine owners and other interested parties deliberately sought to enhance the value of their properties, promoting them to raise capital for their development or to attract a purchaser. Without capital there could be no development, or production. The brightest prospects were understandably the most attractive to investors.

Would-be mining magnates practiced the art of raising money by writing flattering newspaper accounts, advertisements and brochures; by enticing well-known people to become company directors; and through collection of expert testimonies and publication of favorable assays on ore samples, all for the purpose of separating east and west coast investors from their dollars. Promotion typically had little regard for accuracy; fact and fiction became so intertwined that separation of the two may be almost impossible.

Heavy promotion did not always lead to development, nor was a lack of capital the only reason why mining properties might fail to be developed, or shut down after brief runs. Sometimes the price of metal dropped, as with silver after 1893, so that an operation was no longer profitable. If a mine had refractory ores difficult to reduce, or veins and ore bodies too low-grade to work economically, or if the mine had already been worked out, the owners were not likely to advertise such details to prospective buyers.

To do so would have gone against another fact of frontier life, which was that profits were most commonly sought through buying and selling mining properties, rather than by developing them. This was especially true in the early history of a mining district or where ores were of low value. "Booming" a claim or district,

hopefully to increase its value and lure purchasers, would enable the claimants to sell out at a profit or perhaps float more stock. This kind of promotion was easier and more profitable than actual development, since little capital was required and the risks attending development were eliminated.

Studies of territorial mining have given little attention to the pivotal role of capital, to the purchase and sale of mines as a business that frequently outpaced mining itself, or to the necessity for cheap, long-distance transportation in order to carry ores to processing plants. As a result, the romance of mining overshadows its realities. An important negative factor in pioneer mining was sheer incompetence and the waste of both capital and resources. As early as 1859 a correspondent from Tubac complained that the great need was for "men who understand extracting silver from its various ores" (*Sunday Morning Republican* 1859:2). Writing in 1868, J. Ross Browne concluded that

... In many cases the whole capital of the owners has been frittered away in unnecessary buildings, improper machinery, and large remuneration to unworthy agents, men who, next to the Apache, have by their recklessness obstructed the progress of the country, and prejudiced capitalists against further investment in it.

Thus far it may be truthfully asserted that there have been more failures in superintendents than in mines in Arizona; (Browne 1868:481)

The only really major mining developments in southeastern Arizona were the Lavender Pit, Copper Queen and other properties at Bisbee, also known as the Warren mining district, and since the 1950s the San Manuel mine at Mammoth and the various ore bodies of the Pima district south of Tucson. The Tombstone, Harshaw, Patagonia, Cochise (Johnson Camp), Helvetia and Oro Blanco districts operated on more modest scales, still in multi-millions of dollars, often active for short periods followed by long closures. Many prospects failed to develop at all.

The most reliable sources for evaluating the significance of mining are actual production statistics where these exist and relevant geologic literature. The reports by territorial and state geologists and by U.S. Geological Survey personnel are valuable as well because these people had technical knowledge and were positioned in ways that allowed them to exercise independent judgements. Their findings and statistical compilations are well scattered through the mining literature.

Much of the mining in southeastern Arizona has been in our Islands in the Desert, and the framework chosen for a history is the various mountain ranges and their

mining districts. Mining district terminology has been stable for a century or more until a number of new districts were added in the 1980s and the older ones realigned or renamed (Keith et al. 1983). For historical background on the organization and management of Arizona mining districts see Lacy 1987:7-10. Use of the older names is retained here except where, as in the Rincon and Pinaleño ranges, some recently-named locations and districts have no older precedents.

Occasionally in older writings one sees the term "chloriders" used in an offhand way. Chlorination mills were viewed for a time in the late 19th century as the poor miner's path to riches. The operating principle was the use of gaseous chlorine or bleaching powder to combine with gold or silver (as from low-grade ores) and the subsequent reduction of precious metal chlorides with a base metal. Chlorination proved to be highly dangerous and technically inefficient. The process was soon dropped (Young 1967:125-126).

MOUNTAINS WEST of the SANTA CRUZ VALLEY

West of the upper Santa Cruz Valley lies a complex of mountain ranges. The easternmost of these - the Tumacacoris, Atascosas and Pajaritos - have seen little mining activity at any period. Further west is a mineralized belt consisting of the Cerro Colorados, Las Guijas, San Luis and Oro Blanco Mountains, Montana Peak and adjoining ridge systems. Within these ranges are a total of four mining districts.

The Arivaca district includes the Las Guijas and San Luis Mountains, northwest and southwest from the old settlement of Arivaca. The Cerro Colorado district lies on the southwestern flank of the Cerro Colorado Mountains. On the north slope of the Pajarito Mountains, between Pajarito Peak and Castle Rock, is the Pajarito mining district. The Oro Blanco district comprises all mining activities in western Santa Cruz County (Keith 1974 and Keith 1975).

Cerro Colorado and Arivaca Districts

In late June of 1855, Lieutenant N. Michler led his section of the U. S.- Mexico boundary party south from Tucson and soon picked up rumors of rich mines. Then he reached the ruins of the old ranch at Arivaca, where

Within four miles, and south of the deserted rancho, are to be found large excavations made by men previously engaged in mining; piles of metallic ore lay near the springs where they had been engaged in smelting (Emory 1857:119).

Findings such as these quickly whetted interest. The boundary commissioner himself, Major W. H. Emory, grew effusive on southern Arizona's prospects for mineral wealth and added that "the country is now full of prospecters from California" (Emory 1857:94-95).

The era of modern mining in Arizona dates from 1857 with the purchase of two Mexican land grants in the Santa Cruz Valley. Both grants, the Sopori and the Arivaca, were eventually rejected by the Court of Private Land Claims, but for a time they provided the legal basis for mining operations to operate within their bounds. The Sopori silver mine or mines were the first to be reopened; work had started by the first months of 1857. The ores were not, as their promoter Sylvester Mowry confidently predicted, "destined to yield hundreds of millions". The Sopori mine, evidently located in the northernmost reaches of the Tumacacori Mountains, soon dropped from sight amidst the maneuvering and conflicting title claims of several individuals and two Rhode Island-based mining companies (Mowry 1857:12, Reid 1935:192, Browne 1974:262, Tenney 1927-1929:242, Altshuler 1973a:63-82, Altshuler 1973b:162-163, North 1980:32, 56 and 198-199).

Three well-known early Arizonians and their Cincinnati-based company became the principals in another early land-holding and mining venture. The individuals were an adventurer by the name of Charles D. Poston; an explorer and cartographer named Herman Ehrenberg; and an Army officer, Samuel Heintzelman. Their Sonora Exploring and Mining Co. was organized in March of 1856; two years later it spun off a subsidiary, the Santa Rita Silver Mining Co. (North 1980:19-22 and 39).

Poston and Ehrenberg arrived in Arizona in August of 1856. Before the end of the year they had established the Sonora Exploring and Mining Co. headquarters at the then-abandoned presidio of Tubac and purchased the title to two *sitios* of land comprising the Arivaca Ranch. By early 1857 they reported the discovery of the Heintzelman vein, on the southeastern side of the Cerro Colorado Mountains, and acquisition of the old Salero mine in the Santa Rita Mountains (North 1980:24-25 and 28, Poston 1963:69-73).

The prospects for this firm's mines were reported as fabulous. The reality was that during the first two years they shipped limited quantities of ores to the East and to California, since the only facilities locally were two small smelting furnaces (North 1980: 30-40, *Los Angeles Star* 1858:2, *The Washington Union* 1858:2). The first bar of silver from their works at Cerro Colorado was produced in March 1859. Sometime that year the company's engineers initiated use of the barrel amalgamation process for silver extraction, but the long-planned amalgamation works at Arivaca never quite reached completion. The business suffered from a host of labor and technical problems as well as a shortage of capital, and in 1861 Apache raids added to the owners' woes. The result was an estimated production of only \$75,000 in silver from 1858 through 1861 (Tenney 1927-29:270-273 and 478, North 1980, Anon. 1859:1-18). Operations ended in late July of 1861 when Mexican bandits murdered Charles Poston's

brother and two other men at the Cerro Colorado mine (Altshuler 1984:60-61).

The Cerro Colorado district underwent a brief revival in the early 1880s when the Consolidated Arizona Mine and Milling Co. built a stamp mill and amalgamation plant at Arivaca. Sporadic operations continued into the 1930s. The total value of production since 1856 is estimated at \$362,000 (Tenney 1927-29:270-274 and 478, Keith 1974:19-21 and 113-114). The Arivaca district experienced intermittent, small-scale mining through 1941, for a total value of base and precious metal output of about \$369,000. In both districts the economic values, mainly in gold and silver, were confined to spotty, near-surface exposures where weathering and oxidation had enriched the vein deposits (Tenney 1927-29:270-274 and 478, Keith 1974:12-14 and 103-107).

Pajarito Mining District

In the rugged hills west of Nogales are a half-dozen small mines, reportedly worked since the middle 1800s for high-grade silver pockets. Perhaps these were the "New Silver Mine" announced in the April 28, 1859 *Weekly Arizonian* (p. 2):

Capt. Donaldson, U.S. collector at Calabasas, has lately, after considerable search, discovered what he considers to be the old Tomocacari silver mine, located about 18 miles from the Mission, in the range of mountains which lies west of the Santa Cruz valley. There are six openings at this mine, with a trench, the remains of furnaces, &c, which proves that extensive operations were once carried on.

In more recent years the Sunset and the Morning and Evening mine groups plus the St. Patrick, White Oaks and Big Steve mines operated sporadically. The primary values came from 1,000 tons of ore, mainly lead and silver, worth about \$68,000 (Keith 1975:18-19 and 72).

Oro Blanco District

Six to a dozen miles southeast of Arivaca, in the hills to either side of Oro Blanco Wash and California Gulch, lie the mines and camps of the Oro Blanco district. The gold placers and lode deposits were first worked in the Spanish and Mexican periods. Of these we are told that

The fact of gold mines having been worked by the Mexicans in that section years ago has been long known, The ruins of arrastras, mining camps and cabins being scattered around, the basin wherein they are situated is now known as Old Oro Blanco, the present settlement of Oro Blanco

being situated about seven miles more northerly (*Daily Arizona Citizen* 1880b:2).

The first American location was made in 1873, on the Oro Blanco vein. The Ostrich, Yellow Jacket and other lode mines were located soon afterwards, about the same time that the placers were rediscovered. While placer deposits occurred throughout the Oro Blanco mountains, lode mining operations were concentrated in three principal areas. Within two miles or so of Oro Blanco and to the west lay the Oro Blanco, Ostrich, Yellow Jacket and a number of smaller mines, while the Austerlitz mine was south of the town. Many other mines, including the Margarita, Warsaw, Smuggler Gulch and Rubiana mine groups, were about seven miles to the south along Warsaw Gulch near Old Oro Blanco. Finally there was the Montana mine group, adjacent to the 20th century mining camp of Ruby (Tenney 1927-29:283, Keith 1975:15-17 and 61-69, Sherman and Sherman 1969:113, Wilson et al. 1983: 188-191).

New discoveries followed in 1880, notably the Montana Ledge. Several small mills built during the early 1880s operated when water was available; at the Ostrich mill a roasting furnace for treating sulfide ores was attached. Miners lived at the Oro Blanco camp, which one writer described after "a careful visit":

Oro Blanco is a quiet little town, inhabited by a superior class of miners and workmen, and all are opposed to sharps, tramps and jumpers. They are an intelligent class generally, and are determined to keep a model mining camp, free from loafers, rowdies and reckless characters. The mining claims are numerous and show prospects that will soon bring capital among them (*Daily Arizona Citizen* 1880c:2).

By 1887 the better ore had largely been exhausted from the oxidized zones near the surface and mining all but ceased. The gold output to the end of 1886 probably did not exceed \$700,000 (Tenney 1927-29:284).

The principal mineral values during the earlier decades were in gold. The district received its name from the placer gold being largely alloyed with silver, so that the yellow color was lost. In lode mining the most successful ventures were the Montana, Austerlitz, Yellow Jacket, and Old Glory mines, all of which contained low-grade gold ores. At several of the larger veins the mineralization changed at shallow depths to zinc-lead-silver sulphides, which were not worked successfully until the 1920s (Tenney 1927-29:287-288, Keith 1975:16, Wilson 1981:82-83).

After its initial boom, the Oro Blanco district saw intermittent production for another forty years. Much

of the time the mines were inactive. When silver mines closed in 1893, attention again turned to gold. Several of the old gold mines reopened and new mills were erected, only to lapse within a decade. Activity revived again in 1903 when eastern companies organized to operate the mines and build mills for both the amalgamation and cyaniding processes. All work had ceased by the end of 1904 (Tenney 1927-1929:284 and 287-288, Wilson et al. 1983:188-189). With respect to this history of sporadic activity at Oro Blanco, a mining engineer a few years later commented that

.... most of the money was spent on reduction works rather than underground development. As is usual, this kind of mining met with financial disaster in nearly every case (Milton 1913:1005).

There were other brief revivals, but by 1914 mining had virtually stopped. The Oro Blanco post office was discontinued in 1915.

Base metal production — lead and zinc — in the Oro Blanco district dates from 1912 and first became significant in 1917 - 1918. The Goldfield Consolidated Mines Co. leased the Montana mine then, but only for a year. The first really large-scale operation in the district came when the Eagle Picher Lead Co. reopened the Montana mine in 1927 and built a new mill to concentrate the lead-zinc ores. This mill closed in 1930, resuming in late 1934 with an increased capacity. The Montana mine produced lead-zinc minerals with gold and silver as important by-products until May of 1940, by which time the company had mined about 870,000 tons of ore. Since 1942 the district has seen only minor, sporadic activity. The estimated total value of both base and precious metal production through 1972 is \$12,900,000 (Tenney 1927-1929:283-284, 287-288, 321-324 and 488, Keith 1975:65, Gov. of Arizona 1898:258, Ariz. Bur. of Mines 1951:41-49).

Ruby

A mining camp known originally as Montana camp grew into the principal mining town in the Oro Blanco district. The camp was named for Montana Peak just south of it. The origin and early years are obscure, but the beginning probably does not predate discovery of the Montana Ledge in 1880. Through the long years of intermittent mining a small community persisted. During a brief revival of the Austerlitz and Oro mines in 1912, application for a post office was honored and the old Montana camp became the mining town of Ruby.

Prior to his death in 1903, George Cheyney of Tucson had started a general store at Montana camp. This passed through a series of owners until 1913, when Philip Clarke bought the business and erected a new adobe-frame building. This new store and post office became the setting for two episodes of murder that

brought Ruby briefly into the headlines. Two brothers named John and Alex Frasier were running the store when two Mexican bandits shot and killed both men during a daring daylight robbery. John Frasier lived long enough to identify the murderers. Both robbers disappeared into Mexico, but one returned to a mining camp near Tucson. The sheriff sent two deputies to arrest him; the outlaw drew first and killed one of the deputies but was quickly gunned down by the other (Tenney 1927-1929:322-323, Long 1965:24-25 and 72-72, Meyer 1974:22-23).

This happened in February 1920. A year and half later Frank and Myrtle Pearson owned the Ruby store. Frank's half-sister Irene and sister-in-law were visiting at the time of the bloody episode on August 26, 1921. Seven armed Mexicans broke in, shot Frank Pearson and then murdered his wife after forcing her to open the safe. The sister-in-law, an eye-witness, related what happened when she gave an interview years later:

I saw a pistol lying on a table and picked it up. I don't know why I did so, for I didn't know how to use it. I pointed the gun at the bandits, and one of them fired at me! It was a near miss; the bullet came so close that it seared my face....

In the confusion, Irene grabbed the Pearson's four-year-old daughter and dived out the door:

Although mortally wounded, Frank managed to get his gun and fire it, but he died as he pulled the trigger and his shots went wild, the last one ricocheting across the floor as he fell. I fainted (Long 1965:25).

The robbers took their loot and fled across the border. Subsequently two of them, Placido Silvas and Manuel Martinez, were captured and brought to trial. Silvas received life imprisonment while the hangman carried out the sentence against Martinez (Long 1965).

The depression years coincided with Ruby's heyday. The population rose to over 1,000 in the 1930s with about 350 miners at work. The Montana mine and mill made Ruby the largest producer of lead and zinc in Arizona for 1935-1939 inclusive. When the ore gave out in 1940, the mine closed and mill was moved to Sahuarita. Ruby itself became a ghost town, one of the best preserved ones in southern Arizona (Ariz. Bur. of Mines 1951:41-49, Meyer 1974, Jenkins 1967:28-30, Varney 1980:88-90).

THE SANTA RITA MOUNTAINS

The same early entrepreneurs began mining in the Santa Rita Mountains at nearly the same time as their developments in the Cerro Colorado and Arivaca districts. By the 1880s the Santa Ritas had been extensively prospected and many mines established.

In all but two of the six mining districts mineralization was found to be spotty and sparse, with most of the economic returns coming from oxidized deposits near the surface.

The Tyndall district is in Santa Cruz County, where it extends south from the border with Pima County along the western flank of the Santa Rita range as far as Sonoita Creek. At one time the southern part of the Tyndall district, so named in 1876, was called the Aztec district. To the east lies the Wrightson mining district, on the southeastern slope of the Santa Ritas and south of the divide that extends east from Mt. Wrightson ("Old Baldy") towards Sonoita Creek (Keith 1975:25-28).

North of the Wrightson district to Box Canyon, the Greaterville district takes in most of the north-central Santa Rita Mountains in Pima County. In the 1870s this was first known as the Santa Rita placers, then as the Smith district, and finally (since 1880) as the Greaterville district. Just to the west of it is the Old Baldy mining district, a small area that includes the mountainous slopes to either side of Madera Canyon and a prominent west side spur of the Santa Ritas. At the northern end of this range are the Helvetia and Rosemont districts, the former covering the north and northwestern slope of the mountains. The Rosemont district comprises the eastern slope, east and south-east of the main Helvetia mining area (Keith 1974:25-33, Schrader 1915: Plate I).

Tyndall District

In 1858 the Santa Rita Mining Company began re-opening the Salero, Ojero, Asugarero, Bustillo and other old mines in the southern Santa Ritas, seeking the argentiferous galena ore exposed in oxidized, near-surface deposits. The company managers accomplished little more than the construction of a mining camp, the Hacienda de Santa Rita, situated 1.5 miles from the Salero mine in the southern part of the district.

The Salero mine had been worked in the Spanish or Mexican periods. The new camp lay about 300 yards from what Charles Poston pointed out as

.... the old Hacienda of the Santa Rita mines, (which were destroyed some 35 years since by the Apaches who also massacred every soul belonging to the mines, not one escaping). Here were discovered the remains of old furnaces and other evidences of mining operations (Grosvenor 1858:293).

By 1861 the company's improvements at the "new" hacienda included several houses, the beginnings of a mill, and one furnace (Browne 1974:228, Grosvenor 1973:15).

There are good accounts of the Santa Rita Mining Company's operations (Altshuler 1984:21-76, Pumpelly 1918, Duffen 1960). The experiences of Raphael Pumpelly, a mining engineer and the last manager before the Civil War, are especially apt because he grew quite familiar with the local geology. Pumpelly said that the veins were thin, their work was mere prospecting, and they had not enough ore to meet expenses. The company, never well financed, ran out of money. Work here was dangerous because the mine superintendents were as likely to be murdered by their Mexican workmen as by roving Apaches. Pumpelly ended up as

.... the only one of at least five successive managers of the Santa Rita who was not killed by Mexicans or Indians (Pumpelly 1918:199, 207 and 224-226).

The furnace at Santa Rita eventually made a single run, which required six weeks and was done using ore mostly from the Heintzelman (Cerro Colorado) mine. Harassed now by Apaches and threatened by their own laborers, the surviving Americans packed up the remaining property and headed for Tubac before the silver was cool. This was on June 15, 1861. Three years later the place still stood abandoned. In 1865 the Apaches murdered William Wrightson, sent out to reopen the mines, and work stopped again (Tenney 1927-29:244 and 314-315, Browne 1974:228-230, North 1980:201, Anon. 1897:402).

The property was relocated and some \$10,000 worth of ore shipped in the 1870s. About 1900 the Salero Mines Co. bought the claims, two years later they began development and operated intermittently until 1911. Total production from the Salero mine is estimated at only 500 tons of lead-silver ore (Schrader 1915:194-197, Tenney 1927-29:315, Keith 1975:87).

Most of the other mines -- the Alto (also known as the Gold Tree and El Plomo), Wandering Jew, Bland, Baca Float, and Toluachi or Josiah Bond mines, Trenton, Arizona-Pittsburg and Eureka (Old Mexican) -- in the Salero-Alto area are a few miles north of the Salero property. These holdings were worked sporadically and produced small amounts of ore. The Alto mine, another alleged Spanish discovery, saw occasional mining activity during the late 19th century and again through the 1920s. Estimated and recorded production of lead-copper-silver ore here totaled 3,500 tons (Schrader 1915:197-214, Tenney 1927-29:314-317, Keith 1975:83).

The Salero and Alto mines are the most significant historically in the Tyndall district. Nearby ghost towns are the remains of camps associated with the early 20th century workings. At Salero camp the adobe buildings were still roofed and described as beautifully preserved as of 1980. The town of Alto had 700 people

as of 1905, with the usual stores, bars and school. The post office remained in service there until 1933 and its ruins are the principal remaining structure today (Sherman and Sherman 1969:133, Varney 1980:80-82).

As of 1909 the entire Tyndall district contained forty or more mines and prospects. Most claims lay on or near major drainages that issued westward towards the Santa Cruz Valley. Mines that were worked to some extent after 1900 included the Elephant Head group along Chino Canyon, the Devil's Cash Box and other prospects along Agua Caliente Canyon, and the Montosa mine some 1.5 miles farther south. A smelter at the latter operated for four and one-half days back in 1901. In Josephine Canyon the mineral deposits were in the upper parts of the canyon. These saw considerable development but little production, the ore being mostly low-grade. South of the Salero property lay the Montezuma mine, a low-grade ore claim allegedly worked in the Mexican period but very little since then (Schrader 1915:180-220, Tenney 1927-29:314-321).

The only modern production has come from the Glove group of mines along Cottonwood Canyon. These properties produced nearly 30,000 tons of argentiferous galena ore in the years between 1952 and 1972. Intermittent operations at the Jefferson mine in the Alto area saw some 6,500 tons of lead-silver ore extracted between the early 1900s and 1950. The total estimated and recorded production of all metals from the Tyndall district through 1972 is about \$3,600,000 (Keith 1975:27 and 85-86).

Wrightson District

Economic mineralization in the Wrightson district is spotty and sparse. The ores include argentiferous galena veins that are oxidized and enriched near the surface. The area was first prospected in the late 1870s and mined as recently as the late 1950s, much of the activity taking place from about 1906 through 1911. The total value of the lead, silver, copper and gold recovered is placed at about \$138,000 (Schrader 1915:220-239, Tenney 1927-29:317-319, Keith 1975:28-29 and 88-90).

Greaterville District

This district has both lode and placer deposits, but the history of mining is essentially about the placer activity around Greaterville. Gold placers there occupied an area of about eight square miles known initially as the Smith diggings or district, at the eastern foot of the Santa Rita Mountains. The first discoveries were made in 1874 and a rush developed the next summer. The Tucson *Arizona Citizen* of July 3, 1875 reported that:

Wednesday of this week this town was again surprised at the products of placer-gold in Smith district. David Burroughs brought in from there 9 1/2 ounces of nice placer-gold, the product of three days' work of himself alone, and he carried the dirt three-fourths of a mile in a sack on his back to water, where he washed it under unfavorable circumstances. The gold averages coarse. One piece is worth about \$50, another near \$35, and others from \$1 to \$5. His claim is in a gulch making into the main placer-ravine from the Santa Rita Mountain side.

We learn that Horace Arden has regularly made an ounce a day in the Smith district, and that he is not noted for working imprudently hard, but goes along cleverly, making his \$16 to \$20 per day; the gold being worth these figures per ounce.

Since the above was written, Jack Ralston came in from the Smith district with \$150 more placer-gold -- nuggets we should say. The largest piece is worth just \$90.50, and the balance in bits from \$1 to \$10. This gold was washed, and by packing the dirt a long distance to water. The hills and gulches all about have gold in them, and with plenty of water, millions could soon be taken out (Raymond 1877:342).

With news like this, the wonder is that Tucson didn't turn into a ghost town.

The placer gold occurred in gravels exposed by a series of steep-sided gulches that drained towards the east. The productive gulches were spread over a distance of just 1.5 miles, from Boston on the south to Empire on the north. This proved to be the largest and richest placer ground in southern Arizona (Schrader 1915:158 and 162-164, Wilson 1981:74-76), and a number of mining camps sprang up. One description from October 1875 said that Sucker gulch was becoming quite thickly settled with eight or nine different camps on it (*Arizona Weekly Citizen* 1875a:3). A correspondent in February 1876 regretted that space would not permit a description of the different camps, but noted that there were about six with some 350 miners and a reservoir at every camp (*Arizona Citizen* 1876:2). Greater Creek or gulch was presumably the original name for Ophir Gulch. A post office established there on January 3, 1879 was called Greaterville.

Placer mining requires water, and water was scarce here. The nearest permanent source was Gardner Canyon four miles to the south. When the gulches were not flowing with runoff, the miners bought water that had been packed in on burros. To work the gravels they either used rockers, which were abbreviated riffle boxes mounted on traverse rockers, or long toms -- long wooden troughs with baffles on the bottom

(Schrader 1915:158, Young 1967:54-56). Notwithstanding the difficulties, the output amounted to \$10 or more a day for each man. By February 1876 a prominent merchant, Herman Welisch, estimated that the placers had already yielded between \$60,000 and \$80,000 in gold (Schrader 1915:159, *Arizona Citizen* 1876:2).

The Greaterville placers remained active for several years, but by 1886 the richer gravels were considered worked out. From then until 1900 the Greaterville camp was practically dead. For several months that year and again in 1904, two firms tried to work the ground of Kentucky Gulch by hydraulic methods. The returns were reportedly too low to warrant further work and operations ceased (Schrader 1915:158-159, Tenney 1927-29:277).

Since 1905 several companies have tried various methods to work parts of the placer area. All failed because of insufficient water and poor selection of ground. Individuals meanwhile continued intermittent, small-scale placer mining, obtaining several hundred to several thousand dollars worth of gold a year by their efforts. Estimates of the total production of Greaterville's placers between 1873 and 1948 vary widely, from a minimum figure of \$210,000 to an upper one in the millions of dollars (Schrader 1915:159-160, Tenney 1927-29:277-278, Wilson 1981:72-73).

Lode deposits in this district were small and weak, with enriched, oxidized outcrops furnishing economic returns estimated at \$30,000 through 1929. The principal lode lining took place at the Conglomerate or Anderson mine, worked sporadically from the early 1900s to 1955. It produced a small tonnage of lead-silver ore (Schrader 1915:152-158, Tenney 1927-29:278, Keith 1974:25-27 and 120-121). [Varney 1980:79 refers to the Anderson mine as the "Snyder mine"].

Greaterville continued as a post office until 1946, long after its prosperity had left. All that remains today are three small adobe homes, a collapsed wood and tin structure, and a small cemetery (Sherman and Sherman 1969:70-71, Varney 1980:78). Kentucky Camp, scarcely a mile to the south, was bought up sometime before 1911 by a Tucson lawyer, Louis G. Hummel. His daughter and her husband later took up residence there and turned it into a cattle ranch, called the Fenter place. The last cattle were shipped about 1965 and the land was sold again, to a mining company (*Tucson Citizen* 1979 [Section C]:1-2).

Old Baldy Mining District

This area lies on the northwest side of the Santa Rita Mountains in both Pima and Santa Cruz counties, just west of the Greaterville district. Prospecting and

superficial development began in the 1880s but only one mine -- the Jackson mine in Jackson Canyon -- produced more than token amounts of ore. Stone Cabin and Jackson canyons held most of the other prospects, the values of which were principally in copper. The total estimated and recorded production of ore is valued at about \$8,000. In addition to these lode deposits there are molybdenite prospects about half a mile south of White House in Madera Canyon and the Old Baldy gold placers below the mouth of the canyon (Schrader 1915:166-180, Keith 1974:33, Keith 1975:15, Wilson 1981:80).

Helvetia and Rosemont Mining Districts

These two districts at the northern end of the Santa Ritas have been the source of most base and precious metal production from this mountain range. The estimated and recorded values, primarily of copper and silver, totaled \$7,780,000 through 1972 (Keith 1974:31). The histories of these copper-production centers are closely linked and they are treated here as a single district.

Rosemont was a classic example of boom and bust in copper mining. Mining claims had been located as early as 1879, but virtually no work was done until L.J. Rose organized the Rosemont Smelting and Mining Company. In 1894, with copper at rock-bottom prices, this firm commenced to develop its properties and erected a 60-ton copper-smelting furnace. They blew it in and operated sporadically until June 1896. At that time the claims and other possessions of this undercapitalized business passed into the possession of the Lewisohn Brothers, copper brokers, of New York City (Tenney 1927-29:252 and 473-474, Gov. of Arizona 1895:354, 426, Gov. of Ariz. 1898:279, Ayres 1984:27-28).

The fortunes of the Rosemont camp rose and fell with the market price of copper. The new owners bought other nearby properties and began to develop these as well. A two-story frame hotel, the principal building in the camp, was erected at about this time (1897). In 1899-1901 copper prices reached their highest level since 1883. The Lewisohns took out 3,000 tons of ore from their chief producer, the Mohawk mine in the adjoining Helvetia district, and packed some 500 tons of it over the mountains to the Rosemont smelter. This smelter saw intermittent use through 1901, when it closed for good. In later years the Narragansett or Daylight-Narragansett claims were the principal mines worked in the Rosemont district (Schrader 1915:115, Tenney 1927-29:252, Ayres 1984:30, Gov. of Arizona 1899:146-149). The post office at Rosemont opened in 1894 and closed on May 14, 1910, after mining became inactive. The Lewisohns retained ownership of the townsite and some 59 claims (Sherman and Sherman 1969:130, Ayres 1984:30-38, Blake 1910:6).

When copper prices rose again with the beginning of World War I, mining resumed in the Helvetia-Rosemont districts. The Rosemont group of claims, located about 1.5 miles east of Helvetia, yielded large amounts of copper and zinc in 1917-1918. After 1920 these became virtually idle with only small, intermittent shipments of ore by lessees.

Much more significant was the Narragansett claim, near the crest of the mountains on the Rosemont side. This property had been owned by the same man, J. K. Brown, since 1879 and developed by him. Brown sold his claim in July 1915 and the buyers, Narragansett Mines Co., began production in September. This mine became the largest single producer in the Helvetia-Rosemont districts with a reported output of over 34,000 tons of ore in the 1915 to 1918 period, yielding a smelter return of \$835,860 (Tenney 1927-29:254-255 and 473-474, Ayres 1984:132-134).

A mining camp referred to as New Rosemont, a short distance east of the Narragansett mine, came to life in 1915. Within two years this community had a population of about 200, with 30 to 40 men employed on each mine shift. Here as elsewhere the usual dwelling was a tent or a pole frame building covered with bear grass. Other buildings included the mine owner's house, a pool hall, assayer's residence, deputy's house, boarding house and diner, dance hall and saloon, and of course the company store. All operations ceased when copper prices plummeted in 1921 (Ayres 1984:132-138 and 523-530).

Since 1920 the mines on the Rosemont side of the Santa Ritas have been idle most of the time. During the 1944-1947 period when the Helvetia district saw levels of production exceeding 1,000,000 pounds of copper a year, most of the ore came from the Rosemont group, the Copper World, Mohawk and probably the Narragansett mines. The last owner-operator, C.D. Wilson, continued until the end of February in 1961 (Ayres 1984:136, Creasey and Quick 1955:304 and 312-319, Keith 1974:31).

The Helvetia district, on the north and northwestern slope of the Santa Ritas, had quite a different history. There were approximately 35 mines, with the first locations made in the late 1870s. In 1881 a group of men from Tucson organized the Omega Copper Co., and enlisted working capital from Philadelphia. They developed a considerable tonnage of high grade oxidized ore and erected a small blast furnace, which was blown in in April of 1883. Six months later all work stopped. Meanwhile a second venture, the Columbia Copper Co., built another small furnace just east of the later Tiptop camp, but closed it early in 1883 due to a drop in the price of copper (Schrader 1915:96, Tenney 1927-29:251-252, Feil 1968:77-95).

An 1899 report noted that the Helvetia district had been shipping copper ore for years, under circumstances that are rarely glimpsed:

.... These ores have been taken from the most superficial openings and pits here and there in a multitude of places, and without the aid of capital. The work has been done by poor prospectors who have been maintained by the proceeds of shipments of ores taken from the croppings (Gov. of Ariz. 1899:149).

This prospecting soon changed to mining. The Helvetia Copper Co. of New Jersey acquired many claims in 1891 and commenced development work. Helvetia camp reportedly began forming at this time. The company completed its assessments by March of 1899 and had a 200-ton blast furnace ready in September of that year. Helvetia was already a boom town; by May 1898 it had permanent company buildings, several stores, a line of tents to house the laborers, four saloons and an eating house. The work force grew from less than 55 men to 350 between March and December 1899 as expanded operations got underway. The total population of Helvetia reached nearly 550 persons in December 1899, the same month the town received a post office. For several years this was Pima County's largest mining camp (Feil 1968:80-83, Sherman and Sherman 1969:78, Varney 1980:77).

The citizens enjoyed baseball games, dances, baptisms, weddings and perhaps even knife fights, but they did without established law and order until 1901. The consequence was "the somewhat uproarious nature of life at Helvetia" as one writer expressed it (Feil 1968:85-86).

Mining and smelting of copper ore continued through 1900, hampered only by periodic shortages of water or of coke for the smelter. In December 1900, after a production of over 2,000,000 pounds of copper, the smelter caught fire and burned to the ground. Layoffs followed and although reconstruction began, production did not resume, copper prices then being in a decline. The Helvetia Copper Company shut down all operations by the end of 1902.

In 1903 the business was reorganized as the Helvetia Copper Company of Arizona. A year of development work followed and after that construction of a 150-ton copper-matte smelter. This smelter did not prove a success and closed early in 1907. Thereafter until 1911 the company shipped its ore. By July of 1911 the mines had closed (Schrader 1915:97, Feil 1968:92-94). Other small mining enterprises in the Helvetia area included the Tip Top Copper Co., which started operations in September 1904 and sent its ore to El Paso. They closed down in 1907 and reopened only briefly in 1912 (Tenney 1927-29:253-254).

Helvetia lost both its importance and most of its population after 1911. A few dozen people continued to live there, buoyed by the hope that the mines would reopen. This never happened and in 1921 the post office was discontinued, followed in two years by closure of the school. A large abandoned store building emphasized the now-forslorn appearance of the town, while the weekly dance was held in the old dining room of the abandoned, half-tumbled-down hotel. As for everything else,

The old buildings, most of them crumbling adobes long exposed to the weather, had been patched with whatever material was available at little cost. There were five fairly well preserved frame houses from which most of the paint had faded. The gaunt old pioneer school house with its tall steep roof was also of lumber, apparently never painted (Bourne 1974:68-70, 75, 84 and 100).

Lessees continued small-scale, irregular production at the mines and output rose to another peak in 1944-1947. There has been very little activity since the 1950s and the town itself was reduced to one roofless adobe ruin as of 1980 (Feil 1968:94, Keith 1974:31 and 123-129, Varney 1980:77).

THE PATAGONIA MOUNTAINS

Until the 1870s the uplands now known as the Patagonia Mountains bore the name Santa Cruz Mountains. Prospectors covered these hills in the late 1850s, even as they combed the Santa Ritas and the Cerro Colorado - Arivaca country. Two of the five mining districts in the Patagonias became major producers while the Patagonia mine, renamed the Mowry mine in 1860, is one of the most famous in Arizona.

The Harshaw mining district at the northeastern end of the Patagonias is bounded on the north by Sonoita Creek, on the east by Harshaw Creek and Meadow Valley Flat, to the south by an east-west line through American Peak, and by the general crest of the mountain range on the west. Immediately to the east and northeast lies the Red Rock district, which extends east to the approximate axis of the Canelo Hills. This district's northern and southern limits are Sonoita Creek and Meadow Valley Flat respectively. The Palmetto mining district adjoins the Harshaw district on the west and takes in the northwestern flank of the Patagonias from Sonoita Creek south to Paloma Canyon. It continues west to the eastern boundary of Baca Float No. 3. South of the Palmetto and Harshaw districts, to the Mexican border, is the Patagonia mining district. Its eastern line is the west edge of the Santa Cruz valley plain while the western boundary is an extension of the Palmetto district west line southward to the Santa Cruz River. West of the Palmetto and Patagonia districts, as far as Nogales Wash, lies

the Nogales mining district (Schrader 1915:239, 245-246, 279, 292 and 348, Keith 1975:11, 14, 19-20 and 24).

The predominant metalliferous mineralization in the Patagonias has been argentiferous lead, zinc and some copper minerals. The oxidized zone near the surface gives way to sulfides at depth. The Harshaw and Patagonia districts are well mineralized while mineral values in the Nogales, Red Rock and Palmetto districts are spotty and weak, except for a large copper deposit at one mine in the Palmetto mining district.

Harshaw District

Mineral locations at the northern end of the Patagonias were rediscovered before the Civil War. Two of the earliest claims there, the Flux and the Trench, subsequently produced almost 85 percent of the estimated 1.3 million tons of ore yielded by mines of the Harshaw district through 1964.

The Flux mine, four miles south of the present town of Patagonia, had allegedly been an old Spanish or Mexican working. After it was relocated in 1858, the owners smelted the richer ore in an adobe furnace near the mouth of Alum Gulch (Schrader 1915:259, Tenney 1927-29:309). Then in late 1858 "Colonel" Henry Titus and George Mercer found two mines, the Trench and Compadre, that exhibited more impressive evidence of earlier labors:

... Cols. Titus and Mercer discovered two of the best [mines] in this country about a month ago; they are situated on the Santa Cruz mountains, four miles from Ewell's.

They are undoubtedly the best mines in the country, and were long and ardently sought after. They have been worked on the most extensive scale by the Spaniards, who abandoned them years ago on account of the Apaches, but before doing so, they covered them and they have been lost for years, until the recent discovery. The amount of labor done, exceeds that on the Sierra [sic] Colorado mine. They are the mines known in mineral works and in the traditions of the Mexicans as the Compadre mines. The one is argentiferous galena, of the richest kind, and can be reduced by the blast furnace in the cheapest manner. Thirteen old furnaces were found upon the ground, which had been extensively used by the miners who constructed them (*Texas Republican* 1859:2 [extracting from a letter dated Fort Buchanan, December 16, 1858]).

Titus' Union Exploring and Mining Co. explored these claims for awhile, then sold them in 1859 to the New York and Compadre Mining Co. This company did a

little work before abandoning the mines upon the outbreak of the Civil War (Anon. 1859:8, Schrader 1915:253, Tenney 1927-29:306, *The Weekly Arizonian* 1859a:2; 1859c:3; 1859d:3; 1859e:3). About 1872 the Trench mine was relocated and worked for the rich surface deposits, which yielded 87 ounces of silver per ton (Raymond 1877:343-344, Tenney 1927-29:303, Keith 1975:58-59).

The Hearst estate bought the Trench mine in 1880. A series of lessees then developed and worked the property extensively before the price of silver dropped and all work stopped in 1894. Ore shipments resumed in 1918 and continued through 1925, after which lessees carried on sporadic operations. By 1939 American Smelting and Refining Co. (ASARCO) controlled the property and greatly increased the production of lead and zinc ores with high silver values. Twenty years later the major deposits were becoming depleted to the point where production came to a virtual standstill in the mid-1960s (Schrader 1915:253-254, Tenney 1927-29:306-308, Keith 1975:12-13 and 59).

The Flux mine, worked from the 1850s to 1963, accounted for more than half of the ore tonnage from the Harshaw district. This mine was relocated in 1882 and several thousand tons of ore shipped to the Benson smelter. Everything remained quiet until 1897; then for the next 60-odd years a series of lessees operated the mine sporadically, extracting lead and zinc with copper and silver as by-products. An estimated 850,000 tons of ore were taken out before the deposits became uneconomical to mine (Schrader 1915:258-263, Tenney 1927-29:309-310, Keith 1975:13 and 58).

Within this same four-mile-long mineralized belt are the Alta, American, Blue Nose, Hardshell, Hermosa, January, Josephine and World's Fair mines, all principal producing properties discovered in the late 19th century and worked in some instances into the 1960s. Between 1930 and 1970 the Harshaw district reached its peak as a major metal producer, with the total estimated and recorded production of base and precious metals through 1972 valued at about \$41,500,000 (Schrader 1915:245-279, Tenney 1927-29:301-309, 312-313 and 486, Keith 1975:11-14 and 55-60).

David T. Harshaw, a Civil War veteran and member of the California Column, tarried briefly at the Greaterville placers before moving south into the Patagonias. He staked some silver claims there and about 1879 the Hermosa Mining Co., acquired one of his properties, the Hermosa mine. They promptly began development, constructed a 100-ton stamp amalgamation mill, and had this mine in production by October of 1880. The Hermosa mine and mill became the nucleus for the town of Harshaw.

Harshaw boomed overnight; the 1880 census reported 600 people there. The businesses and professions represented at Harshaw — miners, laborers, merchants, blacksmiths, restaurants, lodging houses, saloon and livery stables — made it a typical mining camp. In other ways Harshaw was not typical; it escaped most frontier violence, and many of the buildings were constructed of permanent materials.

Prosperity unfortunately was short-lived. The mine and mill closed in the latter part of 1881 after the better ore had been exhausted. This was a severe blow, although other mining activity in the surrounding mountains kept hopes alive. In 1890 James Finley of Tucson reopened the Hermosa mine and carried on operations until the price of silver dropped in 1893. Finley died in 1899 and lessees took over until 1903, when all work stopped. The only remaining building at Harshaw is the Finley house, built of bricks allegedly taken from the old smelter stack at the Mowry mine (Schrader 1915:246, 265-266 and 272-273, Tenney 1927-29:303-305, Sherman and Sherman 1969:76-77, Varney 1980:97, *Daily Arizona Citizen* 1880a:2, *Arizona Daily Star* 1910f:3, Wehrman 1965:21-36).

After 1883 Patagonia became the principal settlement and mining center in the Harshaw district. Patagonia started as a railroad camp during construction of the New Mexico and Arizona Railroad, then served as a shipping point for the mines in the Patagonia Mountains. The town even had its own smelter for a brief time, blown in in August of 1897 and operated for three months (Schrader 1915:246 and 266, Tenney 1927-29:295 and 305-306, *Arizona Daily Star* 1910j:6 and 11). This community still flourishes as a retirement and vacation center, and as a supply point for ranches in the area. Memories of the half-dozen lesser mining camps scattered through this district have long since faded (Schrader 1915:246).

Patagonia District

This is one of the most historic mining districts in Arizona, primarily because one mine, the Mowry, and one man, Sylvester Mowry. The two largest areas of mineralization are at the Mowry mine and about four miles south at what is called Duquesne - Washington group of mines. Both the Mowry mine and the Montezuma or Empire claims in the Washington area were located in 1858 (Schrader 1915:296, Tenney 1927-29:239-240 and 289, Keith 1975:4 and 22, *The Weekly Arizonian* 1859c:3).

A metallurgist writing in 1860 said that the first parcels of ore from the Mowry mine came "from shafts which had been sunk many years ago, and which had been abandoned (Tenney 1927-29:239). One correspondent enthused that:

.... the whole country abounds with mines of silver, copper and other valuable ores.

As for this particular discovery,

In the mountains of Santa Cruz Valley, about 13 miles from the Mexican line, a new mine has been opened. The company has not yet been organized.... A shaft has been sunk thirty feet deep, with drifts seven feet each way, from which thirty or forty tons of ore have been dug up. Capt. Newell [sic; Ewell] and Lieut. Moore are interested in this new undertaking. The vein is very broad, as the driftings have not yet discovered its margin (*Los Angeles Star* 1858:2).

Captain Richard Ewell, then stationed at Fort Buchanan, visited the mine and apparently had mixed feelings about it. In a letter to his niece he wrote

.... The Patagonia Mine (so they call the one in which I am interested) is fast sinking towards the center of the earth. It is the darkest, gloomiest-looking cavern you can imagine, about 50 feet deep, with prospects looking quite bright. I have been offered \$1,000 for my interest, having at that time expended about \$100; so if we fail, the croakers can't say it was an absurd speculation (Hamlin 1935:85-86).

Until 1860 the property was known by its original name although it had already changed ownership several times. Then on April 9, 1860 Sylvester Mowry bought the holdings for either \$22,000 or \$25,000 and changed the name to Mowry mine. His older brother Charles came west to superintend the operations while Sylvester occupied himself elsewhere until the summer of 1861. With the outbreak of the Civil War, it became necessary to fortify the mining camp against assaults by Apache Indians and Mexican outlaws. Mowry by this time was employing a work force of up to 300 men and handling the mine as if he had sole ownership, though this was evidently not so. He had 12 ordinary Mexican blast furnaces in operation and continued to work right through the period of Confederate occupation (Tenney 1927-29:238-240 and 289, Altshuler 1973a:67, Altshuler 1973b:161-164, *Arizona Daily Star* 1910g:6, Fontana 1958:14-16).

Then on June 13, 1862, a detachment of California Volunteers arrived to arrest Sylvester Mowry and all other men on the premises as suspected Confederate sympathizers. Mowry was taken to Fort Yuma on the Colorado River and jailed for five months; the others were released almost immediately. The mine continued under a receiver for a time, shut down and then resumed a curious on-again, off-again pattern of operation with brother Charles supervising production until early in 1866, when the last period of operation by

the Mowrys ended (Altshuler 1973b:152-171, Browne 1974:203-210).

During its entire early history, production of the Mowry mine went unrecorded. Sylvester claimed that he shipped about \$1.5 million worth of ore, but more reasonable estimates place the value of silver and lead mined from 1858 to 1864 at between \$100,000 and \$485,000 (Schrader 1915:296, Tenney 1927-29:243-244 and 290-291). Whatever the truth, the Mowry mine was the most valuable producing property in Arizona during these early years. It was relocated in the 1870s but very little happened until Silverberg and Steinfeld of Tucson acquired the property in 1890. During three years of development work they took out several hundred tons of ore. In 1904 the Mowry Mines Co. purchased the property and did extensive development work, but their venture failed with the business recession of 1907. The mine has been worked sporadically since, as recently as 1952. The total estimated and reported production of lead-silver ore is approximately 200,000 tons (Schrader 1915:296-298, Tenney 1927-29:291-293, Keith 1975:81, *Arizona Daily Star* 1910j:6, Fontana 1958).

The second large center of mineralization is the Duquesne-Washington Camp area. About the time the Mowry mine was discovered, two men named Thomas Gardner and Hopkins relocated two or three old mines about four miles south of Mowry, near what became Washington Camp. The Montezuma, Empire and Belmont claims lay within a few hundred yards of one another and had allegedly been mined for silver during the Spanish or Mexican periods. Little work was done prior to the Civil War and the district was abandoned (Browne 1868:448; Browne 1974:195, Schrader 1915:322 and 340-341, Tenney 1927-29:293, Keith 1975:4 and 22). Later in the 19th century the Pochahontas, Washington (later called Pride of the West), Bonanza, Annie, Belmont, Empire, Holland and a dozen or so other mines were worked for the high-grade lead-silver ores in their upper levels. The deposits change into massive copper-lead-zinc sulphides at shallow depths.

George Westinghouse of the Westinghouse Electric Co. acquired a number of claims in the area beginning in 1889. The Westinghouse interests, organized as the Duquesne Mining and Reduction Co., invested heavily in development and in equipping their property for large-scale production. Under the reduction methods of that time the complex base metal sulphides could not be treated economically, and attempts to unlock the values led to a long period of experimentation and sporadic operations. Major production finally began in 1912 and continued until about the end of 1918. The mill at Washington closed down then and mining was turned over to lessees. Various deposits have since been worked intermittently, continuing into the mid-

1960s. Total production of the Duquesne-Washington group of mines came to more than 450,000 tons of ore with zinc, lead and copper the principal values and silver as an important by-product (Schrader 1915:321-347, Tenney 1927-29:293-300, Keith 1975:5, 22-23 and 76-81, *Arizona Daily Star* 1910g:6).

Farther west in the Patagonia district lay a series of small copper producers, exploited sporadically in the 20th century. The Santo Niño, located in 1908 and operated through 1955, was the most important of these. For the entire Patagonia district, the value of base and precious metal production through 1972 is placed at \$17.9 million, primarily from zinc, lead, copper, silver and gold. Three-quarters of this total was recovered in the present century (Schrader 1915:306-321, Tenney 1927-29:299-300 and 313, Keith 1975: 23, 75 and 79-82).

The principal mining camps of the district were Mowry, Washington and Duquesne. Mowry probably started in 1858; its heyday came between 1905 and 1907 when the Mowry Mines Co. had 200 or more men engaged in development and operations. Only an extensive series of stone and adobe ruins remained in 1980. Washington camp had been settled by the 1870s. The Duquesne Company added an elaborate concentrating plant and smelter, also building offices, bunkhouses, a boarding-house and a number of dwellings. Duquesne itself, one mile to the south, originated with the Westinghouse involvement and served as the mining company headquarters. Today it retains many well-preserved frame buildings and residences (Schrader 1915:292-293, 308, 312, 317 and 321, Sherman and Sherman 1969:103-105 and 167-168, Varney 1980:98-100).

Redrock District

The Redrock mining district on the northeastern flank of the Patagonia Mountains had small, shallow occurrences of oxidized copper, lead and zinc. The first miners arrived in 1881 in search of oxidized silver ores. They located the La Plata, New York (Jensen) and Meadow Valley mines, all in the southeastern part of the district, and extracted small amounts of ore. Twentieth century discoveries include the Blue Bird mine, a manganese claim in the Canelo Hills in the far southeastern corner of this district; and the Frisco Fair mine group and Durham Copper claim. Sporadic workings in various of these operations continued as recently as the early 1950s. The value of base and precious metals is given as \$15,000. Patagonia was the principal mining town for this region (Schrader 1915:239-245, Keith 1975:24 and 82).

Palmetto District

The exposed mineralization on the northwestern side of the Patagonias consists of narrow veins of argenti-

ferous lead plus an unusual and local deposit of disseminated copper minerals. The Domino, Jarilla, Palmetto (Tres de Mayo) and Sonoita mine groups were all located between 1879 and 1881 and worked during that period. Old shafts at the Palmetto mine may be much earlier. Sporadic operations at these mine groups recovered only 100 to 500 tons of lead-silver ore at each.

Mining activity at both the older argentiferous galena claims and at copper deposits discovered in the 20th century continued as recently as the 1960s. The largest single mine and the most important copper producer was the Three-R property, located in 1897 and situated well up on the western slope of the Patagonias. This body of high-grade copper ore was worked from 1908 through 1956 by a series of owners and lessees, who recovered some 130,000 tons of ore in all. The last recorded production from the Palmetto district dates from 1969, at which time the value of base and precious metal output was given as \$2.1 million (Schrader 1915:279-292, Tenney 1927-29:311-312, Keith 1975:19-20 and 73-74).

Nogales District

This broad region, lying to either side of the Santa Cruz River above Calabasas, has only two localities with reported lode deposits. One is the slopes of Mount Benedict, once called Gold Hill, an isolated peak north of the town of Nogales. This hill was reportedly prospected for its narrow, oxidized veins of lead-silver-gold ore as early as the middle 1800s. Several small mining properties there yielded a total of about 1,100 tons of ore, valued at \$54,000. Work continued to 1967.

The other locality is the Reagan camp, three miles north-northwest of Mount Benedict. Wolframite, a tungsten mineral, was found here in 1906. Between 1906 and the late 1930s an estimated 1,500 tons of 50 percent WO_3 concentrates were produced. Limited commercial production of wolframite was achieved elsewhere in southern Arizona, at the Edna mine group in the Patagonia district and from the Las Guijas and Hartford (Huachuca Mountains) districts (Schrader 1915:348-355, Keith 1975:14-15, 60-61 and 76, USGS 1969:277-280).

Gold placers, reputed to be "the oldest and largest placer mines in this part of the country", occur in the Quaternary gravels along Guebabi Canyon east of the Santa Cruz River. Perhaps these placers were part of the gold mines reported near Guevavi in the Spanish and Mexican periods. They were worked as recently as the 1930s, the output always remaining small. Other gold placers in the Patagonias include the Palmetto placers about 2.5 miles northwest of the Three-R mine; Quaternary gravels approximately two miles southwest of Patagonia; and the piedmont por-

tion of Mowry Wash and its tributaries. At least \$1500 in gold has been recovered in the 20th century. Miners returned to these when lode mining was suspended and in times of economic depression (Schrader 1915:279, 348 and 355, Wilson 1981:83-84).

HUACHUCA MOUNTAINS

Hartford Mining District

Sporadic mining of base-metal sulfides at scattered locations sums up recent mining history in the Huachucas. The total value of the ores extracted, lead, zinc, copper, tungsten, silver and gold, is placed at \$140,000 to \$154,000 in the 20th century. There have been no consistent large operations and a single mining district now takes in the entire mountain range (Ariz. Bur. of Mines 1951:36-40, Keith et al. 1983:30-31, Keith 1985:9-10 and 64-67).

Nicolás de Lafora wrote in his diary entry for December 6, 1766 that the Huachuca sierra had "many silver mines producing very good ore" (Kinnaird 1958:106). As we saw earlier, this must refer to the silver-bearing deposits called the Cave Creek mines on the south side of the range, rediscovered in late 1879. In April of that same year a short-lived Evans district had been organized along Sycamore Creek (now Lyle Canyon) about eight miles west of Camp Huachuca. This appears to have been a small silver camp where the prospectors did a limited amount of development and then waited for buyers, who in this case never came (*Arizona Daily Star* 1879b:3; 1880a:4; 1880b:3; 1880e:4).

Serious prospecting in the Huachucas dates from the summer of 1879, when a group of miners left Charleston, Arizona and worked their way to the head of Ramsey Canyon. There they discovered silver chloride and galena, and located the Hartford mine. Other people swarmed in and on September 10, 1879 they organized the Hartford mining district. By the following summer at least two dozen mines had been located, but despite the usual glowing tributes, very little ore ever came from these prospects. A townsite named Turnerville, just within the entrance to Ramsey Canyon, was laid out in May of 1880 and seems to have folded within the year (*The Tombstone Epitaph* 1880a:2).

Around 1880 there were also silver discoveries or relocations in Montezuma Canyon, just north of modern Coronado National Monument. Assays at the time claimed values of \$12 to \$400 per ton, undoubtedly from the richer surface "float". The State of Texas mine was eventually developed here as a zinc-lead working and achieved moderate production during World War II (Ariz. Bur. of Mines 1951:37-39, Keith 1985:9-10 and 64-67). Also see *The Tombstone Epitaph* 1880a:2.

Small amounts of ore from this district were sent to the smelters at Charleston and Benson in the early 1880s, but when the smelters closed in 1885, work at the mines also ceased. Two years later a fundamentalist preacher named Samuel Donnelly and two partners located the Copper Glance mine, high on the south side of the Huachucas. Initially the ore was rich, a single carload being worth up to \$3,000, and their camp grew to about 80 people. Donnelly ran the Copper Glance mine as a communal enterprise and had the satisfaction of seeing most of his workmen and their families become converts to his fundamentalist beliefs. When the returns from mining grew lean, Donnelly established a sawmill at Sunnyside, several miles down the canyon, to supplement incomes. The mine finally shut down and by Christmas 1898 the last family at the mining camp had moved to Sunnyside. Records of production for the Copper Glance are not available (Gov. of Ariz. 1895:410; 1898:287; 1899:143-144, Tenney 1927-29:148 and 229-230, Sherman and Sherman 1969:148, Keith 1985:65, Rockfellow 1955:135-138, Lamma 1982, Bond 1984:118).

Some two dozen other mines in the Huachucas were worked occasionally between the early 1900s and the 1950s, yielding between ten and several hundred tons of base metal ores per property. The Tungsten Reef, Exposed Reef, Lucky Strike, and Pomona mines were exploited for scheelite (a tungsten mineral) during World War I and intermittently in later years. The 25,000 short ton units produced, nearly all from the Tungsten Reef mine, were nearly 5 percent of Arizona's tungsten production to 1965. Since 1950 the Hartford district has seen little activity (Ariz. Bur. of Mines 1951:36-40, USGS 1969:280, Keith 1985:10).

At various times in the 20th century the Huachucas supported two mining camps. Hamburg, a company town associated with the Hamburg mine and the Hartford-Arizona Copper Mining Co., flourished for a few years after 1906. It was situated in upper Ramsey Canyon and at one time boasted 150 people, a hotel, general store, boarding houses and the usual saloons. Only the site remains today (Tenney 1927-29:230, Sherman and Sherman 1969:73). Garces, known in its early years as Reef and then as Palmerlee, was associated with the Reef mines when these were operated as gold-silver properties. The camp had a post office from 1901 until May of 1926 (Sherman and Sherman 1969:59).

Gold-bearing veins were once reported in Tanner Canyon on the Fort Huachuca Military Reservation, but the more important source of gold in the Huachucas has been placer deposits. As of 1898, good placer ground was said to exist near the Harper mine, several miles southeast of Sunnyside (*Arizona Daily Star* 1879c:4, Gov. of Ariz. 1898:260). Late in the winter of 1911, Ash Canyon in the southeastern part of the Huachucas experienced a minor gold rush. The place

gravels there extended for about three miles along the canyon bottom. Nuggets worth \$50, \$75, and even \$450 turned up in the first year. Sluicing continued through the depression era, with the reported yield from 1934 to 1944 amounting to \$2,085 (Wilson 1981:69-70, *Arizona Daily Star* 1911c:7; 1911f:6; 1911g:9; 1911h:6).

WHETSTONE MOUNTAINS

The Whetstone mining district is coextensive with the Whetstone Mountains. The area has a diversity if not an abundance of metallic mineral resources. Considerable prospecting took place there in the late 1800s with the earliest workings on record, the Two Peaks mine at the southern end of the range, producing about 25 tons of copper-lead ore in 1915. During the 1950s the Nevada and Mascot mines in Mine Canyon and the Copper Plate mine on the southwestern slope reached outputs of over 4,000 tons of low-grade copper ore. Reported values for the modest amounts of base (copper) and precious (silver) metal ores totaled \$26,000. Tungsten ore was mined during the late 1930s - early 1940s while the Star No. 1 (Bluestone) prospect and the Old Windmill No. 1 mine both yielded small amounts of uranium ore. Quartz and flur spar were produced in quantity between 1946 and 1967. The mines in this district have not been active since the late 1960s (USGS 1969:348-351, Keith 1974:47, Keith 1985:15, 50 and 90-91, Marsh et al. 1984:126-129).

RINCON MOUNTAINS

Rincon Mining District

Mountain ranges referred to as metamorphic core complexes, such as the Rincons, are not known to have large metallic ore deposits. When this range was prospected at an early date, nothing more than prospect pits and a few adits resulted. Spotty pockets of mineralization with low values of copper, silver and other metals occur around the flanks and foothill areas. Known mineral locations include the prospects between Colossal Cave and Hidden Spring; north of Happy Valley in the Bear Creek - Fresno Spring - Barney Ranch area; in the Roble Spring - Cañada Atravesada locale; and some "scratching" southwest of Italian trap. Production through 1972 is estimated at 200 tons of ore valued at \$8,000, chiefly in copper, lead and silver. The Roble Spring - Cañada Atravesada claims are now chiefly valued for their low-grade uranium deposits. 58 tons of ore were shipped from there in 1956 while another 102 tons went to a uranium mill late in 1977 (Keith 1974:42 and 141, Marsh et al. 1984:103-105, Granger and Raup 1962:A4-A5 and A34-A37, Thorman et al. 1981:17-19, 40-55).

SANTA CATALINA MOUNTAINS

The Oracle mining district, also known as the Control, Old Hat or Santa Catalina district, lies immediately south of Oracle, Arizona, on the northern slope of the Santa Catalina Mountains. The district spans parts of both Pima and Pinal counties, with lode mines as well as gold placers.

The most noted placer deposits were the gravels along Cañada del Oro Creek, from four to ten miles south of Oracle. Numerous old pits, trenches and tunnels showed that the gravels there had been worked in years past. J. Ross Browne in his 1868 report (Browne 1868:450, Wilson 1981:61) mentioned evidence of earlier work while *The Weekly Arizonian* added a few more details:

Cañon del Oro is situated about 30 miles to the Northeast of Tucson, and is noted as having been the locality of gold washing operations. about a year since. It is a fact that gold exists there, and several experienced California miners believe it would pay a small company to "sluice" the little valley at the upper end of the Cañon, as there is an abundance of good water at most seasons of the year. The party who once attempted to work the Cañon, being annoyed by the Indians, withdrew, and since that time few white men have visited the spot (*The Weekly Arizonian* 1859b:2).

These placers were visited occasionally through the depression years of the 20th century and continued to yield small amounts of gold. For the period 1904-1949 production was valued at \$18,393 (Wilson 1981:61-62). Small operations in Alder Canyon on the other side of the Santa Catalinas recovered about 100 ounces of placer gold there (Keith 1974:35).

Mineralization in the Catalina Mountains is associated with geologic faults and it is along the faults that mines have been developed. The south base of the mountains features scattered prospects and one productive mine, the Pontotoc, which yielded about 5,000 tons of low-grade copper ore between 1907 and 1917. It has not been worked since. Most mining activity has been north of Mount Lemmon and particularly along Oracle Ridge. At the northern end, east and northeast of Apache Peak, lie a series of gold or gold and silver claims known as the American Flag group of mines. Isaac Lorraine made the first locations around 1878; by 1881 the main properties included his American Flag mine, the Pioneer, Wedge, Good Luck, Black Bar, Bullion and Commonwealth. Another mine, the Southern Belle, is said to have yielded large amounts of gold. The small mining camp gained a post office under the name of American Flag. After 1884 the group declined and became virtually inactive. Lorraine, who had sold

his interests in 1881, established his American Flag cattle ranch scarcely a mile away (Gov. of Ariz. 1898:257 and 267-268, Sherman and Sherman 1969:11, Keith 1974:113, Marsh et al. 1984:97-99, Harrison 1972:70-76 and 98).

In the early 1900s this same area became known as Campo Bonito, a name originally applied to a chicken ranch in Bonito Canyon. Around 1909 a Tucson mining promoter persuaded Colonel William F. "Buffalo Bill" Cody that a fortune was waiting to be made here in the Catalinas. Cody bought and leased several mines, including Campo Bonito and Southern Belle, and hired men to work them for gold, silver and tungsten. Unfortunately his properties had probably been worked out. Cody's Campo Bonito Mining and Milling Co. failed soon after the Colonel's death in 1917 (*Arizona Daily Star* 1910c:3, Harrison 1972:76-79 and 167, Blake 1910 1st Section:6, Bowden 1987:29-34, Zachry 1990:37-41).

About five miles to the south in Pima County is the Marble Peak area. Emerson O. Stratton settled there in 1880 and was one of several who located mining claims. A firm out of Boston, the Santa Catalina Copper Company, bought four of the copper claims known as the Apache Mine. By 1882 this company had built a smelter, sawmill, hotel and other buildings and erected a tramway between the mine and the smelter. The mine apparently produced little or no ore and the business closed down after six months.

Difficult terrain and the high cost of transportation discouraged mining in the Marble Peak area, although in 1910 the Phelps Dodge company bought another group of early claims (the Leatherwood and Geesman mine groups) and revived the mining camp called Apache Camp. They did a considerable amount of development work, then had to shut down without achieving production. There were other small camps — Stratton Camp, Daily Camp, Cogdon's Camp — but until the Mt. Lemmon Control road from Oracle via Apache Camp to Summerhaven was completed in the summer of 1920, this country remained largely inaccessible.

Even with the new road to Mt. Lemmon there was no mineral production until 1937. In that year mining began on the Geesman and Daily claim groups. Sporadic mining continued as recently as 1968, with some 136,000 tons of ore produced. Most of this output was in copper values with lesser amounts of lead, zinc, and silver, and about 100 tons of tungsten ore. During times of high metal prices, mining for tungsten minerals also revived several of the old Campo Bonito mines (Tenney 1927-29:250-251, USGS 1969:195 and 280, Harrison 1972:79-84, 169 and 178, Keith 1974:33-35 and 130-131).

THE DRAGOON MOUNTAINS and NEARBY RANGES

The Dragoon Mountains were little known prior to 1876 because they lay within the part of Arizona dominated by the Chiricahua Apaches. When the Indians were moved to San Carlos and their former reservation thrown open, prospectors moved in to explore the hitherto inaccessible ranges. Their hopes of mineral wealth were soon realized.

The lesser ranges and hills that surround the Dragoon Mountains contain the richest mining districts in south-eastern Arizona. For example, north of Dragoon Pass and the Southern Pacific Railroad lie the Cochise mining district and the Little Dragoon Mountains, where the mines at Johnson Camp and other locations produced over \$32 million worth of copper, zinc and silver, mainly between 1945 and 1957 (Tenney 1927-29:221-223, Keith 1985:7-8 and 55-60, Arizona Bureau of Mines 1950, Cooper and Silver 1964:134-140 and 159-189). To the south is the famous Tombstone district, the setting of the San Pedro or Brunckow mine before the Civil War. Development there ended when the workmen murdered three of the supervisors (*The San Francisco Herald* 1860:3, Altshuler 1969:56, 72-73 and 107-108). Ed Schieffelen rediscovered the Tombstone deposits in 1877 and a year later the rush was underway. This silver camp boomed through the early 1880s, then slowed due to progressive flooding of the underground workings and decreasing prices for silver. Through 1901 the camp yielded \$25 million in silver. Operations continued as recently as 1951, the value of production in the 20th century adding an estimated \$13.8 million to the earlier total (Tenney 1927-29:136-179, Keith 1985:12-13 and 73-80). Popular interest in Tombstone and its gunfighters has prompted creation of a vast literature about this colorful mining town on Arizona's frontier.

East of Tombstone and southeast of the Dragoons lies the Turquoise district, known originally for its prehistoric workings of turquoise deposits. Silver-lead ores were mined here to 1893, then in the late 1890s this became a copper-mining district built around the twin camps of Gleeson and Courtland. Mining continued in most years until 1958 with values reaching over 14 million, mostly from copper, silver and gold (Tenney 1927-29:209-217, Sherman and Sherman 1969:44-47 and 62-63, Keith 1985:13-14 and 80-85, Ransome 1913:125-127). North of Courtland in the Pearce mining district with its principal property, the Commonwealth mine. This was worked almost continuously from 1895 into the early 1940s, producing ores with valuations in excess of \$10.6 million, mainly in silver and gold. Since 1971 fluorite has been mined there (Tenney 1927-29:214-216, Sherman and Sherman 1969:116-117, Keith 1985:11 and 69-70).

The first mention of mining in the Dragoon Mountains came as a spectacular report about some 50 human skeletons having been found in and around an old tunnel "which has every indication of being an old mine" (*Arizona Daily Star* 1879a:2). Unfortunately nothing more was said about this, but by the end of 1879 the Silver Cloud mine had been located and a cut started, with all the trails from Tombstone said to be "filled with prospectors bound on a prospecting trip through the Dragoons". Indeed, a townsite (Dragoon City) had been chosen and a brisk traffic in buying and selling prospective bonanzas was underway (*Arizona Daily Star* 1879d:2; 1880c:4; 1880d:4). The boom was a brief one and probably centered around Black Diamond Peak. People drifted back to Tombstone when the first mills came into service and serious production got underway.

Within a few years prospectors had found the Dragoon Mountains mineralized at their northern and southern ends, to a point where modest production of base metal ores, gold and silver could eventually be achieved. The southern part, from Cochise Stronghold south to the Black Diamond camp, is the Middle Pass mining district. The Dragoon district at the north end includes the mines and quarries south and east of the community of Dragoon. Neither of these districts is a particularly rich one. Mining continued into the 1960s but is quiet at present.

The town of Dragoon began not as a stagecoach station or a railroad siding, but as a mining camp. In 1908 one J.P. Richardson, formerly with the Copper Queen Consolidated Mining Co. at Bisbee, began developing a modest copper discovery, the Centurion mine. By 1911 he had this well along and the newspapers started to take notice:

Things are happening about Dragoon. Everybody for miles about has wakened up. An eighty acre town has been platted. Lots are selling. Two new stores have been completed. A new postoffice is under construction. A well finished school building twenty-four by thirty-six [feet] is now occupied. Lands are being homesteaded and all about the mining properties are getting busy. Plans for the erection of a union club house for mine visitors are under way and pretty soon Douglas and Bisbee will be infants in arms compared to our neighbor, Dragoon ...

There is being developed within a mile of Dragoon station the Centurion mine which bids fair to rival the best copper properties of the territory (*Arizona Daily Star* 1911d:6; 1911e third section:5; 1911g:9).

Dragoon never quite reached the state where it eclipsed Douglas or Bisbee while the mine itself achieved a moderate production of more than 1,400 tons of ore

between 1911 and 1944. Several miles to the north-east, the Texas-Arizona Mining Co. began operation of their lead-silver-gold mine at virtually the same time (1910). This property was turned over to lessees after 1917 and worked intermittently until 1928 (Tenney 1927-29:220, Keith 1985:56-59).

Dragoon (Golden Rule) Mining District

The Golden Rule or Old Terrible mine, about four miles east of Dragoon, was the only major operation in the Dragoon district. This property had been located in the late 1870s and was first credited with an output (\$125,000) in 1883. The ores yielded mainly gold and lead, but never again so much as in the first year. Operations continued intermittently through 1902, suspended for three years, resumed with a new mill from 1905 to 1908, then suspended again. Mining continued sporadically from 1916 to 1957, largely under lessees. Other mines showed mostly lead-zinc mineralization and shipped a few hundred tons of ore each. The total value of base and precious metals extracted through 1970 amounted to \$340,000 (Tenney 1927-29:218, *Ariz. Bur. of Mines* 1951:28-29, Keith 1985:9 and 63-64).

The Dragoon district also has a series of marble quarries. These reportedly began with claims staked by one Leon Ligier in 1909. The early history of these quarries is unclear and appears to involve promotion with very little development. One company proposed to install equipment and begin quarrying right after World War I, but nothing came of this. About 1922 the Painted Desert Marble Company of San Francisco solicited investments in a venture that was supposed to see marble from their Dragoon leases superseding the marbles of Egypt, Greece and Italy. Investors stayed away.

Finally in the fall of 1931 the Arizona Marble Company of Tucson set to work. Their 12-man crew began quarrying a mound near the south end of the Gunnison Hills, between Dragoon and Cochise, Arizona. They expected to ship huge slabs of marble to eastern markets, but their plans ran afoul of the Depression. In 1946 Bud Ligier, son of the original claimant, started the Ligier marble quarries. Initially this business produced various types of colored dimension stone, adding marble granules and chips for roofing and for a type of flooring called Terrazzo during the 1950s. By the time work ceased about 1966, at least eight quarries were active, most of them to the north or west of Dragoon Peak. For the period 1953 to 1959 marble production from the Ligier quarries was valued at \$151,424 (Cooper and Silver 1964:138-140, USGS 1969:396, Keith 1985:9, 43 and 65, Murbarger 1955:11-15) [Also see Anon. n.d.; the same ephemera file contains five newspaper clippings dated 1919 (2), 1923 and 1931 (2) on marble in the Dragoons].

Middle Pass Mining District

This district had a number of scattered mines and prospects, none of them large producers nor any of them worked for more than a few years at a time. The outputs consisted mainly of base metal sulfides with a little tungsten and barite ore. Principal values were in zinc and copper with lesser amounts of lead, silver and gold, amounting to about \$1.725 million through 1970 (Keith 1985:10-11 and 67-69).

The largest single operation, the Abril mine north of China Peak, produced nearly 30,000 tons of zinc-copper ore, mainly in the 1945 to 1952 period. Two miles to the south, the owners and lessees at the San Juan or Gordon group of claims recovered over 17,000 tons of zinc ore, primarily from 1947 to 1951. The smaller Cobre Loma mine at the head of Middlemarch Canyon yielded about 5,000 tons of copper ore between 1915 and 1920.

In 1897 Chinese merchants of Tombstone and San Francisco financed the original work at the Middlemarch mine, along the canyon of the same name. They sold out a year later and until 1916 little was done. The mine reopened that year and a substantial amount of low-grade sulfide ore was blocked out below the oxidized zone. Operation continued until the drop in metal prices at the end of 1920, a concentrator having been added in 1919. The value of production through 1920 was about \$85,000 (Tenney 1927-1929:218-219, Ariz. Bur. of Mines 1951:20-26, Sherman and Sherman 1969:98, Marsh et al. 1984:60, Keith 1985:10-11, 46 and 67-69, Way 1966:17). Work continued intermittently until the 1950s.

The Black Diamond Mine and Camp

At the lower end of this district about 1.5 miles south of Middlemarch Pass was the Black Diamond Mining Co., a venture that is exceptionally well known thanks to preservation of the company records and a recent comprehensive study (Predmore n.d.). The first mining claims were filed in 1891. In 1898 some West Virginia capitalists organized the Black Diamond Copper Mining Co., bought out existing claims and hired the first in a series of five superintendents. Little happened until a 200-ton smelter and an aerial tramway to the mine were ready in 1902. By this time the Black Diamond camp sported a hotel, company offices, saloon, store, jail, schoolhouse, employees' bungalows and miners' cabins, but copper prices dropped substantially. Mining probably got underway in 1902 and the smelter was finally blown in in April 1903.

The management had sufficient water, piped in from the Commonwealth mine at Pearce, but otherwise experienced nearly everything that could go wrong with a new mining venture. The business was under-

capitalized and attempted to operate during a period of low copper prices. They fell behind in paying their men. In 1904 the workers went on strike. The ore itself was refractory and could not be smelted economically. There were accidental deaths and robberies, followed by the murder of a deputy sheriff. Even the principal stockholders couldn't get along with one another! Yet the people at Black Diamond maintained a positive attitude and the 4th of July 1903 saw a grand celebration, topped by a race between the company president, E. D. Kennedy, and a greased pig:

The most exciting number on the program was a race between Mr. E. D. Kennedy, of Warren, Ohio, and a sleek Berkshire from the San Simone pork farm. The latter had been shaved and greased for the occasion and the former, by reason of having in primary, state and national handicaps, entered the contest with the avidity that would have placed Mark Hanna on the tailboard of Teddy Roosevelt's chariot race for the White House... The porker kept in the lead and Mr. Kennedy remained a close second in the race for supremacy.

The judges, men good and true, gave the event to Mr. Kennedy, notwithstanding the fact that the pig crossed the line and no doubt now adds to the aroma of some pisano's frijole feast. Meantime Mr. Kennedy wears his honors very becomingly (Predmore n.d.:25).

The day ended with a dinner at the Black Diamond Hotel and dancing to the strains of the Black Diamond Band.

Faced with all of its difficulties, the company applied for bankruptcy on November 28, 1904. The mine and smelter shut down, reopened briefly and closed again by the end of 1907. The operations had yielded about 7,000 tons of ore, from which 1 million pounds of copper valued at \$150,000 were extracted. In 1912 the mine was sold for taxes and brought just \$1,381.95. After a few years the only resident was a watchman. The old hotel was dismantled in the late 1930s and the heavy mining equipment shipped to Japan as scrap metal (Predmore n.d., Gov. of Ariz. 1898:285, Tenney 1927-29:219-220, Keith 1985:68).

The story of Black Diamond epitomizes the experiences of hundreds of small mines in Arizona. Distant management, insufficient capital, ores unsuitable for economical smelting and labor troubles were all typical problems. The Black Diamond Mining Co. might have overcome these, but there was no remedy for the misjudgment in beginning operations at a time of low copper prices. The revival in 1906-1907, when copper prices were high once again, may have failed because of the business recession in the latter year or from technical problems with the ore.

WINCHESTER MOUNTAINS

The Winchester mining district centers in Severin Canyon, in the southern reaches of this low desert range. Sometime in the 1890s underground workings were opened at a property known as the Hearst mine and some silver ore was reportedly shipped. In 1924 about 266 tons of "siliceous silver ore" were obtained, probably from old dumps, for use as smelter flux. The only other activity took place in the mid-1930s and in 1941 and 1949, when 268 ounces of silver and several hundred pounds of copper and lead were recovered. Prospects for significant economic mineralization are poor (Cooper and Silver 1964:134 and 161, Marsh et al. 1984:130-132, Keith 1985:15 and 91).

GALIURO MOUNTAINS

The Galiuro Mountains are mostly Tertiary age volcanic rocks with little mineralization. Ore bodies were found and exploited to some extent at the exposed older strata, but in this part of Arizona the principal developments lay just to the west across the San Pedro River. The mines at Mammoth were major gold producers until World War II, when gold mining ceased and attention shifted to the base-metal ores found at deeper levels. By the time these ore shoots ran out in the early 1950s values from this camp approached \$37 million. The San Manuel mine a few miles to the south is one of Arizona's major copper sources, with nearly 5 billion pounds of metal extracted as of 1981, 25 years after this operation began (USGS 1969:133-134 and 166, Keith et al. 1983:34-35 and 46-47, Dunning 1966:227-229, 233-239 and 267-268, Peirce 1967:16).

With respect to the Galiuros themselves, we have good, recent information about mineral potential and past mining activities. The range contains two mining districts besides several mines and mine groups unassigned to any district. On the northwestern slope, north of Sombrero Butte and centered around the mines along Copper Creek, is the Copper Creek or Bunker Hill district. The Rattlesnake district includes several mines along Rattlesnake and Kielberg creeks in the approximate geographic center of the Galiuro range (Creasey et al. 1981, Marsh et al. 1984:65-68).

Copper Creek Mining District

The workings in this district were the most significant and probably the oldest of any in the Galiuros. There is an apocryphal story that high-grade lead-silver ore was mined from the Bluebird vein as early as 1863 (Ariz. Bur. of Mines 1951:56, Simons 1964:132 and 167). This is unlikely because of the remoteness of the area and the ongoing war with the Apaches. While mineral exploration was very active at the time, nearly all of this concentrated in the western part of the territory (Greeley 1987:13-30).

In 1883 the Copper Creek area was organized as the Bunker Hill mining district. Little work was done until 1903, when the Copper Creek Mining Co. acquired the existing claims. The first producing mine was probably the Old Reliable, where intermittent operation yielded most of the 30,000 tons of ore concentrated from the district between 1908 and 1919. The American Eagle and Bluebird mines both began production in 1914 and were worked sporadically, the Bluebird chiefly as a lead-silver prospect. Other properties in the group had value mainly for their copper with the Childs-Aldwinkle mine being a major source of molybdenite as well. Copper output peaked in 1936-1938 at over 1 million pounds of metal each year. After 1938 production tapered off and only one or two mines remained active. The value of metals from the Copper Creek district through 1958 totaled \$4,759,129, the last recorded activity there being in 1959. In 1972 Ranchers Exploration and Development Corp. shattered the Old Reliable mine, detonating 4 million pounds of explosives within it, to facilitate leaching of the remaining copper ore (Ariz. Bur. of Mines 1951:56-65, Simons 1964:132 and 154-168, USGS 1969:149, Creasey et al. 1981:29-33 and 87-92, Marsh et al. 1984:65-68, Myrick 1980:737-746).

The principal mining camp, Copper Creek, straggled along the steep banks of the stream with the same name. A post office opened there in 1907; three years later the town boasted 50 buildings with 200 miners and their families. Now the townsite has only building foundations and scattered lumber; reputedly the wooden buildings were torn down in 1958 and the materials used for corrals, sheds, tack rooms and outbuildings at nearby ranches. The U.S. Geological Survey 15' topographic map for this area suggests that another, smaller camp may have lain along Scanlon Creek below Sombrero Butte, near the Magna and Bunker Hill mines (Sherman and Sherman 1969:42; U.S.G.S. Galiuro Mts., Ariz. 15' topographic map [dated 1943]; Thomas 1983).

Rattlesnake District

The Rattlesnake district consists of three low-grade gold mines, all of them along mineralized sections of a single fault zone in upper Rattlesnake and Kielberg Canyons. The Powers mine, discovered around 1908, gained notoriety ten years later from its association with three members of the Power family who shot it out with a sheriff's posse at their cabin in the Galiuros. The Powers had worked the mine on a small scale until the gunfight left three lawmen and Jeff Power killed, and Jeff's two sons the objects of a huge manhunt. In 1932-1933 the Consolidated Galiuro Gold Mines Inc. shipped small lots of gold ore from this property, but recent sampling has found high gold and silver values only in small, erratic ore pods (Creasey et al. 1981:72-73, Wilson et al. 1983:193-194, McBride 1984).

One mile south of the Powers property is the Knothe or Long Tom mine, with two mine shafts about 700 feet apart. This claim was originally worked at about the same time as the Powers mine and yielded a few small shipments of sorted, high-grade gold ore (Creasey et al. 1981:73-75, Wilson et al. 1983:194). About two miles north of the Powers tunnel are the Gold Mountain claims in Rattlesnake Canyon. In 1902 this was called a recent discovery, owned or controlled by the Consolidated Gold Mountain Mining Co. of Tucson. The prospects yielded only a small amount of gold ore and have been idle for many years. For the Rattlesnake district as a whole, recorded production is only 163 ounces of gold (Creasey et al. 1981:33 and 75-80, Wilson et al. 1983:194, Blake 1902:546-547).

Other Mines in the Galiuros

On the west side of Virgus Canyon in the northern part of the Galiuros are the Table Mountain copper claims. In the first months of 1898 the Table Mountain Copper Co. had 75 men employed there, mining and erecting a smelter. Prospects were very optimistic:

The company now has fifty or sixty tents pitched, and these constitute the present living and business apartments. Lumber and material are being hauled into the camp, and more comfortable and commodious quarters will soon be erected. The ore contains silver and gold in addition to the copper. The copper values average from 12 to 13 per cent. On the dumps and in plain sight are many thousands of tons of ore which are supposed to possess good smelting value.

With respect to the smelter,

The heavy stone and timbers are already in place, and much of the machinery which has been purchased has been delivered at Willcox and is being removed to the scene of operations as rapidly as possible...

As for amenities,

.... there has sprung up quite a lively camp at Table Mountain. There are general merchandise stores, restaurants, butcher shops, saloons, of course, and lodging houses, and business in all departments is reported as very brisk (Gov. of Ariz. 1898:286-287).

Within a year the Table Mountain Copper Company had ground to a halt, probably because the ore, described as a black oxide and carbonate of copper (instead of the more usual sulfides) was unsuited for smelting. Estimated production prior to 1928 totaled 400 to 600 tons of ore, which carried minor gold and silver values as well (Gov. of Ariz. 1899:143, Simons 1964:132 and 150-154).

The Jackson mine extends along a southern prolongation of the same fault zone exploited by the mines in the Rattlesnake district. There are shafts and prospects, and actual production features comprising four shafts, two adits and six pits and cuts, all of unknown age. Mineral sampling has revealed variable but generally low values of silver and negligible percentages of gold and copper (Creasey et al. 1981:80-85). Lastly, there is the Sixteen-to-One mine in a deep tributary of Kielberg Canyon, about 2.5 miles west of the Long Tom shafts. The main workings at the Sixteen-to-One consist of two crosscut adits. Neither the latter property nor the Jackson mine appear to have records of production (Creasey et al. 1981:86, Marsh et al. 1984:67).

SANTA TERESA MOUNTAINS

The Santa Teresas are a remote corner of Arizona where the mineral prospects are split between two mining districts. At the northern end, north and east of Old Deer Creek, is the Stanley mining district. The workings here were active during the late 19th and early 20th centuries, at which time they returned small amounts of copper and lead ores. All of these properties lie within a tract called the San Carlos mineral strip that was joined to the San Carlos Indian Reservation in the 1960s. The western parts of the Santa Teresas fall within the Aravaipa mining district, an irregular area bounded by Old Deer Creek on the north, Aravaipa Creek on the west, and the divide between streams tributary to Aravaipa Creek and those flowing into the Gila River on the east (Keith et al. 1983:48-49, Ross 1925:76-77, Walker and Bufkin 1979:44).

Aravaipa Mining District

The Aravaipa district is traditionally divided into two groups. Most of the Aravaipa group of mines and prospects are within 2.5 miles of the old mining camp of Aravaipa. At one time this town had as many as 60 people, but in 1960 only a caretaker lived there. At Klondyke, a one-time distribution point about ten miles to the south, the Grand Reef group of mines extends along an arc from four miles north to three miles east of that tiny community. As of 1960 all that remained there were a store and a gas pump, schoolhouse and teacher's house (Ross 1925:76-77, Simons 1964:2-4 and 131).

Reportedly a Colonel W. C. Bridwell built a small smelter at Aravaipa as early as the late 1870s, but we have no production figures. In 1890 to 1895 The Aravaipa Mining Co. shipped two cars of what proved to be lead-silver and lead-zinc ores from their Arizona, Orejana and No. 1 claims for a mill test. These mines all lie within one and one-quarter miles of Aravaipa. The only subsequent work consisted of \$90,000 worth of lead carbonate ore from the No. 1 claim in 1916.

The Copper Bar and Sam Jones prospects along the north side of Copper Canyon, about two miles east of Aravaipa, were worked in 1902. One car-load of ore shipped to the El Paso smelter yielded 29.7 percent copper.

In 1906 to 1907 the Royal Tinto Mining and Smelting Co. developed these holdings and was promoting them as late as 1911, but they made no new shipments. Another copper property was the Cobre Grande mine, about 0.7 miles north of Cobre Grande Mountain. The deposits there were first located in 1905 and one car-load of ore went to the smelter at Globe. These workings had been abandoned by 1922.

The more significant mines of the Aravaipa group are within a few thousand feet of one another about two miles northeast of Aravaipa. Here the Gran Central Mining Co. recovered 3.5 million pounds of lead, more than 1 million pounds of zinc and \$20,000 in silver from their Grand Central mine and other properties between 1926 and 1928. In 1942 the Athletic Mining Co. acquired the principal holdings; two years later production was underway at the Head Center and Iron Cap mines, with a small amount from Sinn Fein working. Between 1947 and 1957 these mines yielded between one and 5 million pounds of base metals, mostly lead and zinc, each year. At the end of 1957 all of the Athletic Mining Co. properties were shut down (Ross 1925:92-103, *Ariz. Bur. of Mines* 1950:51-60, Simons 1964:131-144, *Arizona Daily Star* 1911i:6).

The mines and prospects of the Grand Reef group lie mostly along or near the Grand Reef fault, between Imperial Mountain (about one and three-quarters miles south of Aravaipa) and Klondyke Wash, east of Klondyke. These were lead-silver mines that also yielded small amounts of copper. Those farthest to the north — the Windsor mine on Imperial Mountain and the Tenstrike mine — were probably worked as early as the 1890s, but achieved little production. The Grand Reef mine in Laurel Canyon was the largest working in this area and although developed in the 1890s, saw no ore shipments until 1915. It yielded about 30,000 tons of ore from 1915 to 1920, became inactive, then produced another 10,000 tons in 1929 to 1931 and 1939 to 1941. Ore extracted at smaller mines along branches of Laurel Canyon generally required concentration before shipping.

Still farther south, on branches of Klondyke Wash east of Klondyke, were the La Clede and Silver Coin mines. Both were low-grade copper-silver (?) and lead-silver properties. Only small amounts of ore were ever shipped, an unknown tonnage from the Silver Coin mine in 1947 plus a few tons from the Tenstrike mine in 1952 perhaps being the last ore shipments from the Grand Reef area (Ross 1925:78-92, *Ariz. Bur. of Mines* 1950:55-56 and 60-63, Simons 1964:131 and 144-149).

In addition to the developed mines, the Aravaipa district contained a large number of undeveloped claims and prospect pits. Northernmost of these was the Princess Pat group. Another series of holdings, on the slopes southwest of Cobre Grande Mountain, was called the Landsman group. Other claims lay mostly in the same areas as the developed mines (Ross 1925:98-102, Simons 1964:138-146 and 149). The total value of production from the Aravaipa district, 1915 to 1958, is placed at \$8,355,870 (Simons 1964:132).

PINALEÑO MOUNTAINS

The Precambrian granite and gneiss of the Pinalenos are virtually unmineralized. There are nonetheless five small metallic mineral districts, none of them very old or the setting for significant ore production; indeed only two have yielded any ore at all.

The Clark district, in the broad pass between the Santa Teresa and the Pinaleno mountains, witnessed sporadic mining since 1900 or before. A few hundred tons of gold-bearing quartz were shipped in 1933 and a small tonnage of lead-copper-silver ore at a more recent date. Veins of barite and fluorite are reported as well (USGS 1969:314 and 352, Keith et al. 1983:22-23, Wilson et al. 1983:192-193, Schnabel and Welty 1986:27). At the north end of the Pinalenos a total of 220 tons of manganese concentrates and ten tons of manganese ore are reported from vein deposits in the Black Hawk district. The dates of production are not known (USGS 1969:217, Keith et al. 1983:18-19, Schnabel and Welty 1986:26-27).

The Black Beauty district on the western slope of the Pinaleno Mountains, evidently in the upper reaches of Van Valer Canyon, consists of tungsten claims. Near the south end of this range in upper Willow Spring Canyon is the Golandrina district, a series of low-grade uranium claims. More uranium claims and also manganese in vein deposits are reported for the Fisher Hills district, northwest of Bowie, Arizona (Granger and Raup 1962:A-15, Keith et al. 1983: map, Schnabel and Welty 1986:26-28, U.S.G.S. 1967 [Map MR-46; South Half]).

CHIRICAHUA MOUNTAINS

Mining in the Chiricahuas got off to a shaky start in the late 1860s, lapsed during the period of the Chiricahua Reservation, then resumed in the late 1870s with a series of short-term, sporadic ventures. All of these failed. The first really successful mineral development got underway in the mid-1920s. Through time most of the mining activity took place in the California district, which covered the eastern slopes south of Apache Pass. On the southwestern side of this range lay a much smaller mining area in Rucker Canyon, known appropriately as the Rucker Canyon district.

Apache Pass Mining District

Apache Pass was a district in its own right and the setting for the earliest claims, which were principally for gold. An 1868 report said that soldiers and others had located a number of lodes south of the pass (Browne 1868:450). John Finkle Stone, president of the Apache Pass Mining Co., bought a half-interest in two of these claims and installed a stamp mill in Siphon Canyon. His plans to start mining went awry early in October of 1869. The Apaches caught Stone and five others on a stage several miles east of Dragoon Springs and massacred the entire party (*Anon* 1935, Valputic and Longfellow 1971:369-378, Schuetz 1986:58).

Stone's company failed, but some mining did take place during the 1880s and again in the 20th century. As of 1910 this district boasted a number of properties, most of them inactive, plus the ruins of two stamp mills and a lingering prospector (Tenney 1927-29:224, Keith 1985:71, *Arizona Daily Star* 1910h:5). The total production for the Apache Pass district amounted to 600 tons of ore, valuable mainly for gold, silver and lead (Keith et al. 1983:16-17).

California Mining District

The late 1870s saw a number of locations made at copper and lead-silver outcrops on the eastern side of the Chiricahuas, especially along Turkey Creek. Former Apache agent Tom Jeffords had three claims himself in Pinery Canyon. By October of 1880 the mines and prospects on the eastern slope had been organized as the California mining district (*Daily Arizona Citizen* 1880d:1, Cramer 1976:288).

A rush was underway and the Tombstone and Tucson newspapers did an exceptionally good job of documenting this boom. In November, activity centered at "the new town of Chiricahua City". According to "Spicer", writing to the *Tucson Citizen*,

.... I will say that a new camp with a boom is springing up here and a town is being laid off. The people in camp commenced to take and improve the lots as fast as marked off. It is located on a beautiful mesa or plateau of land, with at least 200 acres without a break, and slightly undulating toward San Simon valley. The rush for lots became a stampede. Tents went up every 15 minutes; fence poles, wickiups, hockells and all kinds of cheap improvements were in order. From Turkey Creek, near by, poles and brush and posts and rails and house logs were being brought on wagons and carts, on horseback and on foot.

The prospects were impressive. "Spicer" continued:

The new town of Chiricahua City looks more and more like New York city every day; and then it looks some like Rio Janeiro, having a large plaza 300 feet square in the center of town, with an avenue eighty feet wide on each side. And around this plaza the racket commences. A. C. Rynerson & Co. are going to move their store on to the northeast corner; the Dickson house will adorn the southeast corner, as Mrs. E. A. Dickson is now putting up temporary houses so as to be ready to accommodate with restaurant and lodging house in a few days; Douglass Gray will have his assay office at the southwest corner, and other business houses will soon fill up the rest of the space.

There are from 30 to 40 people coming into the camp every day, most of them from the eastward; (*Daily Arizona Citizen* 1880e:2. See also *The Daily Nugget* 1880a:2) ...

Within a month, Chiricahua City's light had dimmed and then disappeared. John H. Galey, an oil man from Pennsylvania, and his partners bought two rich silver claims later known as the Dunn and the Texas mines. Galey organized the Texas Consolidated Mining and Smelting Co. with himself as president and began developing the Texas claim. He ordered a smelting furnace and by early December 1880 had platted a new town of Galeville (*The Tombstone Epitaph* 1880b:1, *The Daily Nugget* 1880b:2).

Galeville became the company town. The smelter was erected on the flat below the Texas mine while the main portion of Galeville lay just above the smelter. When the smelter was blown in in 1881, it was found that the ore from the mine was not self-fluxing and could not be treated. A suitable flux was found at the Granite Gap mine just over the New Mexico line, so Galey's company bonded the new property, mixed the ore with that from the Texas mine, and the smelting process was a success (*Arizona Daily Star* 1911b:6, quoting the *Paradise Record*).

The first ten-day smelter run in 1881 was said to have produced 80,000 pounds of lead from ore that assayed 45 percent lead and 60 ounces of silver to the ton. The smelter operated for several weeks using Granite Gap ore, then suspended early in 1882 when shipments were delayed. About this time the Texas company went broke and all work shut down. The miners themselves tried to continue but failed when they could not obtain the Granite Gap ores. The smelter was dismantled and reportedly moved to Benson, while Galeville itself soon fell abandoned. The output for 1881-1882, including 13,717 ounces of silver, was

valued at only \$19,420 (Tenney 1927-29:227-228 and 459, Keith 1985:6, Lockwood 1932:16; and also see *Arizona Daily Star* 1911b:6).

Galeyville's anecdotes are more impressive than the ca. 50 tons of ore credited to the Texas mine (Keith 1985:54, Lockwood 1932:13-14 and 18). [James Cary published a series of anecdotes in his column, "Galeyville Days", in *Arizona Days and Ways*, the Sunday Magazine of the Arizona Republic, commencing February 14, 1954.] People reminisced that it was a lively camp that employed upwards of 100 men. In January 1881 a Tombstone newspaper described Galeyville as:

.... a flourishing town, containing a Post Office, 14 stores, seven saloons, six boarding houses, four meat markets, three blacksmith shops, two corals, one assay office, one doctor's office, and about forty houses and tents (*The Tombstone Epitaph* 1881:1).

In little more than a year, the town stood abandoned.

That same year (1881) another "growth" industry took root, namely the running of livestock across the Arizona-Sonora border and the subsequent sale of same, without the owners' permission. A gang known as the "cow-boys" kept busy at this, and as one correspondent wrote,

The cow-boys frequently visit our town and often salute us with an indiscriminate discharge of fire arms, and after indulging in a few drinks at the saloons, practice shooting at the lamps, bottles, glasses &c., sometimes going to length of shooting the cigar out of ones mouth; this of course produces a nervous feeling, among visitors especially (Bowyer 1881).

As of 1911 a local newspaper could find only a slag dump from the smelter and a number of the old building foundations at Galeyville and Chiricahua City (See *Arizona Daily Star* 1911b:6).

While Galeyville ran its brief course, the Dunn mine about four miles to the northwest was also active. Jack Dunn located this claim, near Hands Pass, in 1881. He evidently sold it to some Chicago capitalists, who erected a smelter (in 1884?) a mile west of the mine. After some years the smelter was taken down, while about 1899 the Dunn workings were renamed the Hilltop mine. This property subsequently yielded 68 percent of the total mineral output from the California mining district (Gov. of Ariz. 1898:269-270; 1899:173, Keith 1985:52, Drewes and Williams 1973:A5-A6).

Twenty years after Galeyville's boom-and-bust, a copper-mining camp grew up about one and one-half

miles to the south. A couple of prospectors are said to have staked out a small lead-silver claim there in 1900, making their camp at a spring where several *madrone* trees — called trees of paradise by the prospectors — were growing. By the late fall of 1901 the camp warranted a post office and received the name Paradise.

The boom here started in 1904 over a rich copper find and soon the ground was said to have been located for 20 miles around. Several major companies were formed to gain control of the best holdings, among which were the Chiricahua Mine, King Ainsworth mine group, Scanlon mine and Sullivan mine group. At the same time some of the lead-silver lodes formerly worked by the Texas company were relocated and mined sporadically (Tenney 1927-29:228, Lockwood 1931:18, Jones 1968:68-69).

Almost all of the copper-mining activity went into development. Insufficient ore was found at two of the mines while all of the claims had base metal carbonates and sulfides that complicated the reduction process. The boom broke in 1907 due to financial and transportation problems as well as a 30 percent drop in the value of copper (Tenney 1927-29:228, Keith 1985:51-54, *Arizona Daily Star* 1910b:3). The production through 1907 came mostly from the Leadville mine group, a lead-silver proposition that reputedly yielded more than \$25,000 in ore (*Arizona Daily Star* 1910e:6).

Development and intermittent production of copper and lead continued near Paradise until 1918. Sporadic mining as recently as 1952 resulted in small lots of ore. At its peak in 1904, Paradise claimed a population of around 300, along with several stores, a hotel, butcher shop, schoolhouse, jail, 13 saloons and the usual array of miners' cabins. Although most people left after 1907, Paradise still has a few residents today (Tenney 1927-29:229, Lockwood 1931, Sherman and Sherman 1969:114-115, Keith 1985:51-54, Merwin 1967:36-41, 67-69). Like Galeyville, Paradise is more notable for its anecdotes than for ore production.

Most of the mineral wealth in the California district came from the Hilltop mine. This property revived in 1916 when two men from Kansas City acquired the claims and incorporated the Hilltop Metals Mining Co. They then spent eight years developing their holdings, which extended on either side of the mountain crest. Production at the Hilltop and Hilltop Extension mines commenced in 1924 and continued to 1926-1927. During that short period the ground gave up more than \$480,000 in lead and silver, this being almost one-third of the metal values mined in the Chiricahuas. The Hilltop mine reopened in 1952-1953 and another quarter-million dollars worth of ore, mostly lead and silver, was extracted then (Tenney 1927-29:229, Sherman

and Sherman 1969:79-80, Drewes and Williams 1973:A5-A6 and A37-A38, Varney 1980:119-121, Keith 1985:52).

Miners worked intermittently at the King of Lead, Savage, Willie Rose, Homestake, Humboldt, Harris group, Morning Star group and other claims in the northern Chiricahuas. The Silver Prince and the Pine-Zinc properties on the north fork of Pinery Canyon and El Tigre in Pinery Canyon itself were all worked in the 1940s, while recovery work at the King of Lead continued as recently as 1970. Altogether between 1881 and 1970 the California mining district gave up at least 38,000 tons of ore and concentrates valued at about \$1.75 million (Keith 1985:6-7, 42 and 51-55).

Marble in the Chiricahuas

The northern end of the Chiricahuas once held a marble quarry. Denver capitalists formed the Arizona Marble Co. in 1909 and set about developing some 11 claims. They installed what was then a highly mechanized operation and began active work in the summer of 1910. The marble itself was described as "white, with pronounced dark veinings, and a predominating flesh tint" (Anon. 1910:440-443, *Arizona Daily Star* 1910k:20).

Marble from the original quarry was utilized for building construction. Early projects included the First National Bank in Denver, Colorado, and bank buildings in Champaign, Illinois and Missoula, Montana. By late August in 1910 the company had other locations several miles distant. A news item at the end of October said that the company's Whitetail [Creek] property was expected to commence work soon (Anon. 1910:440-443, *Arizona Daily Star* 1910k:20, *Arizona Daily Star* 1910h:5; 1910i:6; 1911a:6).

In 1910, "the first year in which any marble has been reported", total production by the Arizona Marble Co. was reported as 5,043 cubic feet, valued at \$10,086 (Gov. of Arizona 1912:582-583). Unfortunately the venture lasted only a few years before shutting down (USGS 1969:396, Keith 1985:72). In addition to this quarry and those in the Dragoons, marble has been mined in the Tucson Mountains, the Santa Catalinas near Marble Peak, and the northern end of the Santa Rita range. As of 1966 a successor to the Santa Rita Granite, Marble and Mining Co. was the only firm still quarrying in southern Arizona (USGS 1969:390, *Arizona Daily Star* 1910a:4; 1911j:5, Blake 1910:6).

Rucker Canyon Mining District

A mineralized occurrence west of Rucker Lake in the southern Chiricahuas yielded a small tonnage of precious metal ore in 1935 to 1936. One source placed the production at 15 tons of ore from open cut and shaft

workings in some weakly mineralized fault zones (Keith 1985:12 and 70. See also Keith et al. 1983:46-47 for a much different estimate).

THE MINING FRONTIER: A PERSPECTIVE

In constructing a mining history it is important to learn what actually happened, to look beyond anecdotes, the folklore and embellishments, and seek to explain to those who were never part of it why mining was so often a sporadic activity and why many ventures failed in spite of their glowing promotions. We become aware that the romance of precious metals pushes these districts to the forefront, although the principal values lay with the vastly larger amounts of base metals extracted. And last but not most important, we realize that the driving force in mining was market prices. Miners expected to get rich, but profits generally accrued to those who pursued systematic development, not to the ones chasing bonanzas. Southeastern Arizona has an extremely long mining tradition and one that exemplifies almost every aspect of the industry.

Mineral explorations after the Gadsden Purchase focused upon silver, for the excellent reason that silver in the 1858 to 1861 period brought \$1.35 an ounce, a price not seen again for more than a century (Tenney 1927-29:291 and 478). With such rich rewards waiting, any silver mine became a valuable property. Companies were organized in the East to exploit this treasurehouse in the Southwest. The managers sent out to reopen the old mines soon encountered problems with the local labor and Indians, banditry, lack of machinery, a continuing shortage of capital and eventually the Civil War. The difficulties that really defeated these first ventures were technical ones, as with ore veins that proved to be thin, ores that were not always reducible by smelting, and older mines that had already been exhausted of their oxidized, more easily-reduced surface deposits. The few technical people at hand were possibly the best of their day, but overall there was a notable shortage of expertise and at times it simply lost out to promotion. Mine owners and managers were reluctant to admit that problems existed even when they realized them. Variations on these circumstances were played out through the remainder of the century.

Gold mines, of course, were always valuable. Gold discoveries in central Arizona began in 1863. The fair and consistent price offered by the government meant that gold was always attractive, especially when economic downturns and depressed prices put other types of metal mining out of business. The southeastern part of the Territory never had many important gold properties and most of the gold there came either from surface deposits that were soon depleted or as a by-product of base-metal processing in later years.

When serious mineral exploration resumed in the 1870s, southern Arizona fell into a pattern that endured for another quarter-century. This was an era of individual prospectors and small-scale developments. From about 1877 people poured over the hills and one discovery followed another, many of the booms dying out as quickly as they began. In all of this activity there were a few genuine developments such as Tombstone and Bisbee, but many miners learned that it was far easier to make money buying and selling claims than by trying to develop them. A peculiar and infectious optimism that surrounds mining encouraged this attitude, particularly in the newer districts. The hope of selling out at a profit was the best prospect that a claimant had, since the costs of bringing a mine into production were prohibitive for most individuals. Many prospects had relatively low-grade ore beneath the richer surface "float", making the poorer deposits unworkable without extensive development, and good prices. If no buyers for claims showed up, then a booming district could deflate almost overnight.

Outside investment during this period was often misguided. One common mistake was to put money into production facilities such as mills and concentrators at the expense of underground development. This typically led to financial disaster. A related problem and probably not an uncommon one was hiring agents and managers who had little knowledge of their business. Then too, an understanding of ore chemistry was very imperfect and the grading or alteration of ores from one type to another with increasing depths was not yet generally recognized. The latter meant that radical changes in smelting equipment were sometimes required, and a misjudgment might result in reduction works that were useless. Galeyville, Paradise, Black Diamond, Table Mountain, and the earlier years at Oro Blanco provide examples where poor judgement and unskilled operation resulted in capital investments that were largely wasted. This situation changed gradually after the appearance of gold cyanization in 1887 and the selective flotation process in 1905 (USGS 1969:159 and 184). The second process made possible commercial production of zinc, one of the principal metals recovered in southeastern Arizona. Still, even the best-managed ventures had to measure success and failure by the rise and fall of metal prices.

There were also some outstanding successes, chief among them the Warren mining district, better known as Bisbee. Through almost a century of production until the mines closed in 1975, Bisbee recorded an output of nearly eight billion pounds of copper, more than 300 million pounds each of lead and zinc, and

more gold and silver than any other district in Arizona (Keith et al. 1983:52-53, Graeme 1987:51). The silver output from Bisbee was triple that of its famous neighbor, Tombstone. Much more modest but still on a multi-million dollar scale were Harshaw, Patagonia, Cochise (Johnson Camp) and Oro Blanco districts, Helvetia and Rosemont, Turquoise, Pearce, the Aravaipa district, and Copper Creek.

These successes, nearly all of them in the 20th century, have certain features in common. They were well-financed, professionally managed corporate ventures headquartered outside of Arizona. The mining, except at the silver camps of Tombstone and Pearce, was principally for base metals — lead, copper, zinc — with precious metal values an important but secondary interest. The driving force was always market prices, which for lead and zinc tended to be stable over long periods, in the range of 4 cents to 6 cents per pound. A lead-zinc mine once started might therefore remain in operation until the ores had been exhausted. Copper was subject to wide price swings, and values of less than 18 cents to 20 cents per pound meant that the copper mines closed. As for ore volumes and corresponding dollar valuations, the 20th century figures dwarf those from the 19th century. By a similar comparison, the great copper-mining districts at Miami-Inspiration, Copper Mountain (Morenci), and Pima, all elsewhere in southern Arizona, individually yielded (through 1981) about the same amounts of metal as the Warren and San Manuel districts (Keith et al. 1983). Southeastern Arizona has been and continues to be a substantial contributor to the metals industry.

The keys to success in mining lay with access to capital, cheap long-distance transportation, and beneficial market prices. Without these, development was scarcely possible, while with them success might be attainable. The rare and perhaps unique exceptions are the Copper Glance mine in the Huachucas, run for ten years by Sam Donnelly practically as a religious commune, and the Worlds' Fair mine in the Harshaw district, developed with almost no original capital (Tenney 1927-29:301, Lamma 1982).

Today, mining is virtually limited to the copper and other minerals being produced at San Manuel. This compression of activity reflects the exhaustion of some ore bodies and the fact that the smaller lodes and lower grade ores cannot be recovered economically. In the absence of substantially increased prices, mineral mining in southeastern Arizona is, apart from copper, a matter of history.

Historic Small Mining Sites: Research and Management Potential

Mary M. Farrell and Patricia M. Spoerl

Some of the earliest documented mining activities in the American Southwest occurred in the southern Arizona mountains of the Coronado National Forest. Spaniards prospected in the rugged mountains adjacent to the major river valleys as early as the 1600s. Although suffering periodic declines due to Apache raids and poor transportation, as well as fluctuations in metal prices, mining has continued to the present.

Hundreds of small mining sites are scattered throughout the 17 mountain ranges that comprise the nearly two million acres of the Forest. Virtually no archeological work has been conducted at these sites. Material remains of mining endeavors range from fairly substantial examples such as wealthy miners' homes, poor miners' homes, elaborate ore transport systems, small mining communities, some once complete with post offices, and, of course, saloons. More common examples of sites include scatters of tin cans and other metal, dismantled arrastras, adits, tailings dumps and assorted junk of unknown function.

In general, archeological work at southwestern mining sites has been limited to basic inventory and recording with perhaps some consideration of settlement patterning. Only a few studies have focused on broader archeological concerns such as technological systems, land use patterns, economic relations, demographic variables and overall site formation processes (Ayers 1984; Teague 1980). Historic mining sites face not only slow degradation from gravity, rust and souvenir hunters, but also sometimes rapid obliteration from new mining projects. Indeed, the study of historic mining sites has been identified as one of the top four priority topics for research by the Southwestern Region of the Forest Service (Sanchez et al. 1988).

This paper outlines a strategy we've been pursuing to determine what we can learn from small mining sites so that appropriate management decisions can be made. Our approach is based in large part on Hardesty's work with historic mining sites (1981, 1986, 1988; Hardesty and Hattori 1982) and National Register Bulletin 16 (US Department of the Interior 1986) which gives guidelines for creating historic contexts.

We are testing our approach to studying mining sites in two areas of the Forest (Frontispiece). One, the Oro Blanco mining district, lies in the rugged low mountains west of Nogales along the International border with Mexico. The second is the Carr Reef mining area high in the Huachuca Mountains, south of Sierra Vista.

The two areas differ in important ways. In the Oro Blanco district, most mining exploration and development, for over 300 years, has been small-scale, dispersed and sporadic. Often there are no historic records, even in relatively modern times, other than the archeological remains. Small-scale mining activities continue, requiring numerous small cultural resource clearance surveys.

In contrast, most of the work at the Carr Reef was conducted within the last hundred years, and by organized companies, so the documentary record is much more complete. Known archeological remains are limited to a few large features, such as foundations for mills, large waste dumps and former railroad grades. However, a few scattered buildings formed a "town" that was occupied off and on from about 1899 to the 1960s; although the buildings have been removed, there is potential for finding subsurface cultural materials there. Archeological inventory and archival research were initiated when the patented land was acquired for recreation use. This research was continued with campground construction at the old town site and development of an interpretive trail that passes the historic mining features.

The first step in examining historic mining sites includes overview research and the identification of research themes. A history overview completed for the Coronado includes brief descriptions of the over 30 mining districts on the Forest, and an outline of major time periods (Wilson 1987).

Existing anthropological literature provides some guidelines for appropriate questions at mining sites (e.g. Ayres 1984; Godoy 1985; Hardesty 1986; Teague 1987). Mining sites provide concrete examples of the theme of technology and industry, and its effects on the environment and social organization. Mining areas are often considered as peripheries within Wallerstein's world systems model, with economic and power centers far removed from the mining frontier (Wallerstein 1974, 1980; also Hardesty 1986:47). Hardesty and Hattori (1982:27-29) have also found Kirch's (1980) model of evolutionary adaptation useful in the study of change and variability in mining districts, and applicable in historic accounts. The crucial problem, however, appears to be to integrate general anthropological theory with tin cans and tailings dumps. It is in the details of industry-related social processes and mechanisms, and in the testing of the political, social, technological and economic relationships implied by

systemic models, that historic archeology at mining sites could be most valuable.

Research themes, synthesized from questions considered in current historical studies and anthropological literature, include: technology and economics, land use patterns, and social/demographic processes. The most visible features of mining sites tend to be those associated with technology. Technological and economic patterns include types of technology used (Hardesty 1986), and factors related to investment, intensity of development and exploration (Godoy 1985). Land use patterns include how exploitation and settlement are adapted to sources of ore bodies, energy, water and other necessary materials, and how these patterns change through time (for example, fuel changing from charcoal to diesel to electricity). Land use patterns also include the effects mining has had on the environment. Social patterns include concerns about demography, trade, lifeways, ethnicity, status differentiation and ideology (e.g. Teague 1980). Most important in these themes is determining what the theme implies for the geographical distribution of sites, the kinds of activities they are most likely to represent (Hardesty 1988:106) and the anthropological questions that could be addressed.

Next, we identified general property types. These can be constructed by geographic, functional, and temporal distinctions suggested by the preliminary research. Such a typology allows comparisons with other types that relate to the same theme, place, or time. The mining district is considered the basic geographic unit of investigation because districts were organized historically to regulate mining activities in and around a new ore strike (Hardesty 1986:47). Functional distinctions can be divided by Hardesty's suggested themes of mining, milling, transportation, residential settlement. Four broad temporal distinctions have been identified Forest-wide: Spanish/Mexican mining (before 1854), early American exploration (from 1854 to about 1900), early 20th Century developments (from 1900 through World War II) and after World War II to the present (Wilson 1987).

Before outlining the final step let's look at our Oro Blanco and Reef studies. In addition to archeological investigation, we gathered more specific information for the two areas through informant interviews and archival research. Basic are the Arizona Bureau of Mines indices, which list major mines, operators, production and brief histories of mining districts, as well as primary and secondary references. Reliable U.S. Bureau of Mines records date to 1902; estimates are available for earlier periods, but records such as news-

paper accounts often reflect more boosterism than accuracy. Additional information was gathered from census records, geologic reports, mining journals, Arizona Historical Society files, and University of Arizona Special Collections. Mining textbooks, dating from the 17th to the 20th century, suggest the types of technology that could be expected (for example, Agricola 1950; Davies 1896; Egleston 1887; Eissler 1898; Ricard 1907; Thompson 1915). Many of these include practical information on the costs and use-life of items such as stamp shoes, which might be discarded and found at sites even when most equipment has been removed.

Several examples of property types have been identified at the Carr Reef such as the Reef townsite, two millsites, adits, waste dumps and a railway grade. Early 20th century photographs and maps helped identify questionable features, and memoirs of an early resident provide a picture of turn-of-the-century lifeways there. Research themes considered for the area involve technology and economics, with the mineral records indicating limited success and periodic failures. The minerals mined shifted from gold in 1879, when the first claims were filed, to silver and gold at the turn of the century, to tungsten in World War I and finally to quartz in the 1950s. Technology for extracting these metals also shifted through the years. Large investments in cyanide leaching at the turn of the century fueled excessively optimistic newspaper accounts. But the only sustainable exploitation of the area derived from tungsten milling during and after World War I. (It is interesting to note that application was made to the Forest Service in 1983 to prospect for all three of these metals. The work was denied because of Forest recreation priorities.)

Property type examples at the Oro Blanco District illustrate the more dispersed and small-scale operations that have occurred there. This pattern reflects the widespread mineralization of small veins and stringers in the volcanic and sedimentary rocks in the area.

No early Spanish or Mexican lode and placer mining site has been recorded, but documentary sources (Greeley 1987:14; Wilson 1987) and informants suggest that several areas might contain the irregular drill holes, arrastras and adobe smelter remains that could characterize Spanish and Mexican mining. Records indicate that American placer production began as early as 1858. Riveted pipe brought water for placer operations that left cobble piles. Between 1896 and 1904, approximately \$2,000 worth of gold per year was produced from Oro Blanco placers. An inadequate water supply hindered work and much of the equipment had to be specifically adapted for dry conditions. Dams

to catch the intermittent water often filled with sediments washed out during storms.

Except for the Montana Peak area, most lode deposits are too small for large capital investments. Here, individual miners and low-cost, recycled technology, such as arrastras, proliferated. Cyanide leaching was introduced in the early 1900s but the shortage of adequate water limited operations (Keith 1975:17). Residential areas were generally small, such as at MacDonald Camp. Rock walls and melted adobe mark the location of houses for those who worked various nearby mines from 1900 to the 1930s. Foote Camp, with only low rock foundations remaining, was occupied during the Great Depression (Dale 1988).

The major operation of the Oro Blanco district occurred between 1927 and 1940 near Montana Peak. The Montana Ledge was discovered in 1880, and a small community persisted at Montana Camp. The town's name was changed to Ruby when a post office was established in 1912 (Wilson 1987:236-237). Lead and zinc production at the mine became significant during World War I, but large-scale operations in the district date to 1927, when the Eagle-Picher Company built a new mill. Over 800,000 tons of lead-zinc ore were produced by 1940. Not willing to depend on local water sources, Eagle-Picher built a 15-mile-long pipeline from the Santa Cruz River; remnants of the pipeline can still be found in remote canyons on the Forest. On private land and closed to the public, Ruby is a well-preserved ghost town, with almost three dozen standing buildings (Varney 1980:88).

Other major operations during the Depression era include the Margarita Mill. Although nearby mines have been worked since the 1890s (Keith 1975:64), many of the remains at the millsite date to between 1930 and 1937 (Dale 1988). Substantial concrete pillars and a patio remain from the flotation mill, but only cupels and lumber mark the location of the assay office. Worn-out iron balls indicate that crushing operations included a ball mill, perhaps similar to others still standing in another part of the forest.

The third step includes evaluation and management decisions. The identification of research themes and

property types should enable the development of standard research questions. These questions could then be used to evaluate the historic and scientific significance of mining sites.

For example, at the Reef, archeological remains represent most clearly the latter part of its history. Excavations might produce information about the social patterns in the mining town. But new and important data beyond that obtainable from the diverse documentary information could be difficult to extract, because of the long-term mixing of deposits, re-use and removal of structures, and the low visibility of artifactual remains. For now, no further research is planned. The proximity of the campground, however, allows public interpretation of the existing features.

At Oro Blanco, the small sites often hold little information potential in themselves. Nevertheless, taken together they can provide information on the broad array of cultural patterns in the district. The research themes provide guidelines for the identification of the function, and likely dates, for features and sites. Therefore, much information could be gained through inventory and detailed recording, which will be conducted as opportunities arise through compliance work. In addition, informant interviews have proven to be effective in locating and identifying sites, and they will be continued. Synthesis of data to address the general research themes identified could provide a bridge between general anthropological theory about the causes and consequences of industry and technology, and the diverse and scattered material remains found on the Forest.

In conclusion, data collection, classification and comparison of property types, and incorporation of research themes should facilitate the synthesis of data and identify where further research is needed. Further, we expect it will help us to provide archeological and historic information of interest to the public. We expect that this approach will help give us an overall view of historic mining by mining district, and allow comprehensive decisions about management of the legacy of ephemeral, and often unsuccessful, mining ventures in the mountains of southern Arizona.

The Galiuro Wilderness: A Brief History

John P. Wilson

EARLY HISTORY

Remote, primeval, rarely visited. All of these apply to the nearly 120 square miles of the Galiuro Wilderness, an area of rugged beauty and isolation 50 miles northeast of Tucson, Arizona. This Wilderness comprises much of the Galiuro Mountains, a desert range bounded to the west by the San Pedro River Valley and on the East by the Aravaipa Valley. Travelers on State Highway 77 can see the western scarp of the mountains at a distance, but the only access to them is by foot or horseback on Forest trails. The Galiuros have borne this name since about 1870; earlier references called them the San Calistro or San Calisto mountains, and the Sierra del Aravaipa (Wilson 1990:10, Anon 1868, Bureau of Indian Affairs n.d.).

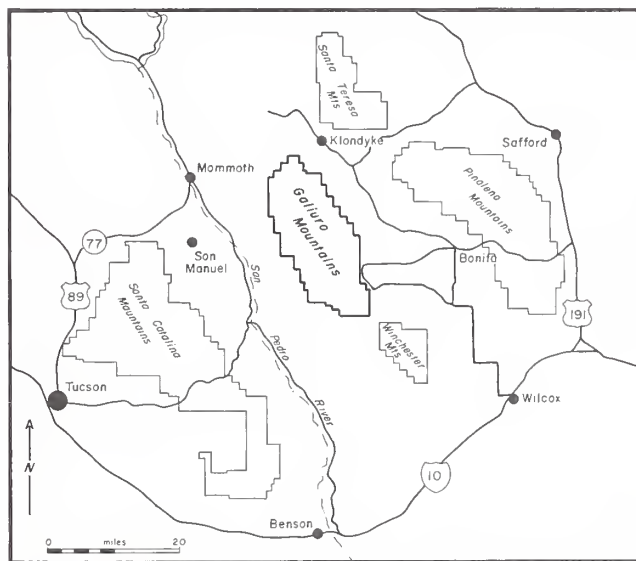


Figure 1. The Galiuro Mountains in relation to principal roads and towns

This is a relatively young mountain range, formed in mid-Tertiary times by block-faulting and uptilting of the earth's crust. The uppermost part of the geologic sequence is a local volcanic field known as the Galiuro Volcanics. These rocks overlie older granites, quartzites and other formations that are found exposed farther west. Structurally the Galiuro range consists of two high, parallel ridges separated by a pass and two medial valleys, one sloping north and the other to the south. These deeply incised valleys, Rattlesnake and Redfield, run parallel to the lengths of the ridges. High-angle drainages dissect the mountain slopes fronting on the San Pedro and Aravaipa valleys (Creasey et al. 1981:3-6, Marsh et al. 1984:65).

The most prominent peaks in the Galiuros reach elevations above 7,000 feet. Canyons and north slopes at higher elevations support ponderosa, Chihuahua and Mexican white pines, Douglas fir, Arizona cypress and Mexican pinyon trees. Elsewhere the mountains exhibit moderate to dense growth of alligator and Utah juniper, pinyon, and several kinds of oak. In the foothills and on the lower slopes one finds heavy stands of manzanita, mountain mohogany, mesquite, acacia, scrub oak, cacti and other brush. Periodic fires help to control the amounts of this shrubby cover. Along the watercourses, riparian growth includes Arizona sycamore, alder, ash, bigtooth maple, walnut and Apache plume. Although there are no permanent streams or lakes, surface water may be found at springs, all of which have been improved for livestock use. None of this country has been commercially logged. Most of the Wilderness is rough and brush covered, with the result that travel is limited at all times to pedestrian and horseback traffic on cleared and graded trails (USDA - Forest Service 1972:399.02-3).

In 1540 the Spanish explorer Francisco Vásquez de Coronado crossed what is now southern Arizona, probably passing just east of the Galiuros. His army had followed the San Pedro River Valley northward to about Tres Alamos Wash, then trailed off to the northeast and crossed over the divide into the lower Sulpher Springs Valley. They continued down this broad valley to the upper Aravaipa drainage, always with the Galiuro Mountains on their left. Some scholars place Chichilticali, Coronado's "red house", in this stretch of country. This was a principal place-name at the time, but its location soon became lost. One of the expedition chroniclers wrote that the natives of that region were the most barbarous yet encountered, people who lived by hunting and in *rancherías* without permanent settlements (Wilson 1990:19, Winship 1896:516-517, Udall 1984:12, 20, Haury 1984:14-19).

In the three centuries after Coronado, the Galiuros were virtually ignored. One visitor was the pioneering Jesuit, Father Eusebio Kino, who made a rapid trip down the San Pedro Valley and stayed the night of November 14, 1697 at a Sobaipuri Indian Village called Aribabia. This little town lay west of the Galiuros in the vicinity of modern-day Mammoth, Arizona. Aribabia and the other Sobaipuri farming communities along the San Pedro were frontier settlements, a buffer against their enemies, the Apaches, and another hostile Indian group called the Jocomes, both of whom lived farther to the east. The Jocomes, a little-known group later absorbed by the Apaches, were probably the aboriginal inhabitants of the Galiuro Mountains. Spanish and Mexican soldiers penetrated this country in pursuit of

Apaches, but their campaign journals reveal little (Wilson 1990:21-32, 46-55, 83-85, Manje 1954:81-83, Forbes 1957:321-324, Smith et al. 1966:38-39, Griffen 1983:329-342).

The Galiuros became part of the United States with acquisition of the Gadsden Purchase in 1856. Government exploring expeditions soon criss-crossed southern Arizona to determine the boundary with Mexico and lay out railroad and wagon road routes. None of these parties visited the Galiuros nor did anyone report Apache bands living permanently in this range. Later during the Apache wars, Army patrols did have a couple of fights with hostile Indians here (Wilson 1990:93-100, Webb 1939:57 and 59, Goetzmann 1959:180ff).

When prospectors arrived in the Galiuros they discovered minerals around Sombrero Butte, a few miles west of the Wilderness. Supposedly some mining took place as early as 1863, but it was another 20 years before this area was organized as a mining district. The lead, silver, copper and molybdenite produced from the Copper Creek Mining District, beginning in 1905, were valued at more than \$4 million by the time mining ended in 1959. At Table Mountain some 4 1/2 miles to the north, an energetic development of copper ores began in 1898 and the newspapers reported that "a lively camp" had sprung up. The short-lived "boom" here ground to a halt within a year (Gov. of Arizona 1898 and 1899, US Congress 1898:286-287 and 1899:143, Arizona Bureau of Mines 1951:57, Creasey et al. 1981:32-33).

Perhaps it was prospectors from Copper Creek or Table Mountain who first explored the higher reaches of the Galiuros. The beginnings of mineral exploration there are lost to history, but the first claims date from 1902, on some low-grade gold prospects along upper Rattlesnake Canyon (Blake 1902:546-547). A tiny community grew up; besides the tents and cabins of the miners, Gold Mountain sported a saloon and a red-light house. Very soon the mining company pulled out and the original miners all left. A visitor long afterwards found

...a few dilapidated log cabins still standing, the ruins of flimsy tent-houses, wagon wheels, tin cans and other rubble strung along Rattlesnake Creek (Ridgway:1984:1-c).

The higher part of the Galiuros was removed from public domain and added to Crook National Forest on September 26, 1910. This protection was not for the timber, of which the Galiuros had very little, but for the watershed, which in desert lands is an even greater

consideration (King 1915:1 and 8). The ranger station for the district that included the Galiuro Mountains lay along Aravaipa Creek near the tiny settlement at Klondyke.

Early-day Forest Rangers had law enforcement duties, which meant that they customarily went around armed. Occasionally one of them wound up in a gunfight. One such incident involved F. Lee Kirby, an early ranger on the Aravaipa District. At a dance in Klondyke a miner with a quarrelsome reputation, Perry Tucker, insulted a woman with whom Kirby was dancing. Tucker warned Kirby not to come to the mine that Tucker and his partner Al Bauman were then working, to which Kirby responded that he would come if his business required it. This mine lay in the headwaters of Kielberg Canyon in the Galiuros, on Forest Service lands. At that time it was known simply as the Abandoned Claims. Within a few years it would become notorious as the Powers Mine.

The mine was on a main trail and several weeks later — January 3, 1912 — Ranger Kirby rode by. He stopped and called out at the mouth of the mine tunnel. The partners came outside and the three men talked, with Tucker doing some threatening, until Kirby started on his way with Tucker close behind. Bauman reentered the tunnel but a few minutes later he heard Kirby calling him and so stepped back outside. Once again he heard his partner tell the ranger not to pass through or stop there any more, and Kirby answered that he would pass by and stop if he had any business. Tucker, whom Bauman thought had already determined on trouble, then threw out the taunt that "If you want gun play you've got it!"

Both men went for their weapons, but Kirby fired first and emptied his gun into Tucker, who managed to get off at least one shot. Tucker gradually sank down until he was sitting in the trail, then leaned over on his elbow and laid his head down, dying on the spot. The ranger was unhurt and rode into Klondyke, accompanied by Bauman. A coroner's jury returned to the site the next day and held their inquest, with Bauman as the only witness. They ruled that Kirby had acted purely in self defense (McBride 1984:16-20).

Ranching got its start in the Galiuros at almost the same time as mining. In the 1890s and through the first decade of 20th century, the principal type of livestock was probably Angora goats rather than cattle. Goat ranching paid well and the brushy slopes of the Galiuros and neighboring hills were ideal range for these browsing animals. One of the goat ranchers was Pete Spence, who had a one-room log cabin well up in the

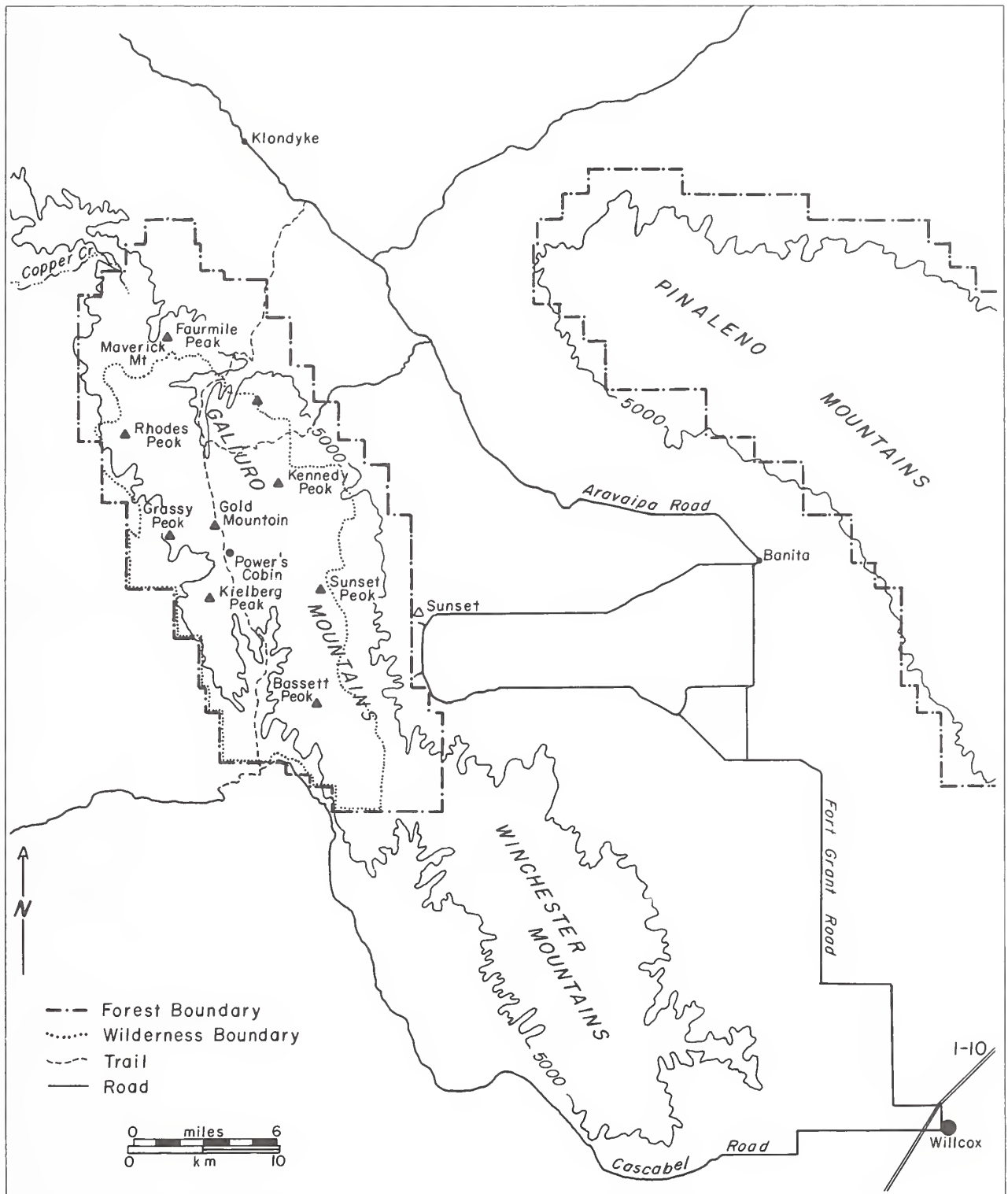


Figure 2. Power's Cabin and other principal features of the Galiuro Mountains.

mountains at a place called Rattlesnake Springs. The location is now known as Power's Garden (King 1915:1 and 7, Swift and King 1915:3, Power 1981:10).

THE POWER FAMILY

The Power family left an indelible mark on the history of the Galiuros. They came originally from west Texas but had moved around for years as Jeff Power, the father, sought work and tried his hand at ranching. They came to the Galiuro Mountains in 1909, to a place in lower Rattlesnake Canyon. Two years later the oldest son bought out Spence's goat ranch. The family moved there and continued raising horses and cattle, also adding four rooms to the cabin and building a couple of corrals. They raised a garden as well, thus the nickname Power's Garden. At this time the Power family consisted of the father, Jeff, also known as the Old Man; his three sons Charles, John and Tom, and a daughter, Ola May. Rattlesnake Springs was their main headquarters until about 1917. By then the oldest brother, Charles, had sold his share of the cattle to the rest of the family and left for New Mexico.

The Powers were a fairly typical family – close-knit, quick to defend their interests, rarely staying more than a few years at one place – in what was still a rough and occasionally violent frontier. Life was not easy and the Power men periodically sought employment with other ranchers or at the mines around southern Arizona to supplement the income from their own cattle. They also held mining claims at Rattlesnake Springs and Gold Mountain. Bauman and Tucker, whose Abandoned Claims holdings lay scarcely a mile south of Gold Mountain, were neighbors. A mile farther south, Ed Knothe worked at his Long Tom (Knothe) mine, while a few hundred yards northwest of Knothe, Jay Murdock and his father had taken up claims on a neighboring mountainside. All of these properties lay along upper Rattlesnake Canyon and in the headwaters of Kielberg Canyon (Power 1981:7-26, McBride 1984:1-16 and 21, Wilson et al. 1983:193-194).

As miners, these people did little more than assessment work to hold their claims, probably hoping to eventually sell out at a profit. It was typical that individuals expected to make money by selling their claims rather than by bringing a mine into production, especially if a property had only low-grade ore. The gold and silver prospects in the Galiuros were all extremely low-grade and limited to the shear zone along a single fault line (Creasey et al. 1981:69-93, Marsh et al. 1984:65-66). The Powers of course were not geologists and they may have been wildly optimistic about the value of their holdings.

What has been called the Tragedy of the Galiuros started when Jeff Power bought Perry Tucker's one-quarter interest in the Abandoned Claims from Tucker's estate. Eventually the Old Man and his sons acquired a three-quarter interest in this property, now known as the Powers Mine. They also had gold fever, and started serious preparations for mining after selling their ranch and cattle at Rattlesnake Springs.

First they built 25 miles of wagon road through some of the roughest country imaginable, completing this with the help of a hired man, Tom Sisson, early in 1917. The road ran from the Haby Ranch, several miles above Klondyke on Aravaipa Creek, south for a dozen miles before dropping down what is still called Power's Hill into Rattlesnake Canyon, then up this canyon to the mine sites.

Next, the Powers purchased a second-hand stamp mill and hauled this to Gold Mountain, where the family and Tom Sisson now lived in the old buildings. There on December 6, 1917, a week after her 23rd birthday, Ola May Power "came to her death from an unknown cause" according to a coroner's jury. The circumstances were never really explained at the time and lingering questions have prompted later writers into endless speculation and some graphic descriptions. Following her death, the Power men and Sisson moved to the cabin near the Powers Mine (Power 1981:17-23, McBride 1984:21-41).

By this time the United States was well into World War I. At their father's insistence, Tom and John Power, aged 24 and 26 years, had failed to register for the draft, making them what were called "slackers". They must have realized the seriousness of their action although Tom Power later claimed that they were told the Army did not need them, after which "we did not give the matter any more thought." They apparently took to hiding in the hills around Gold Mountain and when Jay Murdock asked about their whereabouts, Jeff Power lied that the boys had gone to Old Mexico.

The law did not regard draft evasion lightly. In mid-January 1918, as the Powers completed their preparations to begin mining and processing ore, Sheriff Robert F. (Frank) McBride of Graham County happened to meet their neighbor, Jay Murdock, in Safford. At the sheriff's request, Murdock finally agreed to carry a letter back to the Galiuros and deliver this to Jeff Power. The letter outlined the situation that his sons now faced and asked them to come in immediately. The Old Man evidently thought that the sheriff wouldn't follow up on his words. Tom and John Power stayed out (Power 1981:21, McBride 1984:26-29 and 40-42).

SHOOT-OUT AT DAWN

The climax came several weeks later. On February 9, 1918, Deputy U.S. Marshal Frank Haynes, Sheriff McBride and deputy sheriffs Martin Kempton and T.K. "Kane" Wootan started for the Power's camp. Marshal Haynes carried arrest warrants for Tom and John Power on draft evasion charges, while the sheriff had warrants for the Old Man and Sisson, who were wanted for questioning in connection with Ola May's death. The lawmen drove as far as the Upchurch Ranch near Klondyke the same evening. They borrowed horses, saddled up and rode south into the Galiuros during the night. Some time in the early morning hours the posse arrived at the cabin near the Powers Mine and silently took up positions, two men north of the house and two to the south. Inside were Jeff Power, his two sons, and Tom Sisson.

Just before dawn on Sunday, February 10th, the Old Man rose and started making a fire in the fireplace. John built a fire in the cookstove. They heard two of their horses gallop by and the dogs started barking. Jeff Power grabbed his rifle, went to the door (which faced to the east) and stood there looking out. Just then "Kane" Wooten yelled, "Throw up your hands! Throw up your hands!" (Power 1981:23-27, McBride 1984:51-52 and 58-63).

What happened next was a shoot-out that left four men dead and a bloody trail in Arizona's history. Marshal Haynes, the only survivor of his party and a badly rattled man, made a statement a few days later. In 1968 Tom Power gave his version of events (Power 1981). Their accounts disagreed at points since neither man saw everything that happened; Power remained inside during the fight while Haynes witnessed part of what happened outside.

According to one reconstruction, Jeff Power had stepped out in the yard when almost immediately someone inside the cabin began firing through the doorway. Marshal Haynes pumped two bullets through the door and one into a nearby window as he and McBride ran for the north end of the cabin. One or both of the deputies then opened up from the yard, but Mart Kempton was cut down either by the Old Man or by a shot from inside. Kane Wooten fired and felled Jeff Power with a bullet in the chest. Wooten ducked for cover at the southeast corner of the house, where he glimpsed a figure at the window and fired through it. He tried to scuttle away again but Tom Power caught his silhouette outside the window and fired once, downing Wooten with a shot in the back. Both deputies now lay dead in the yard. Meanwhile, flying glass had hit Tom Power in the left

side of his face while slugs striking the doorjamb had driven wood splinters into his brother's face.

Sheriff McBride hugged the northeast corner of the cabin while the marshal went to check the west side. He could see nothing and came back to find the sheriff sprawled on the ground, dead. Empty cartridge cases indicated that Tom Sisson had poked his rifle through a crack in the logs and put three bullets into the sheriff. The shooting stopped about this time and Marshal Haynes retreated to where they had tied the horses, mounted his own and then "I came into Klondyke just as fast as I could come". About 25 shots had been fired. It was all over in a few minutes (Power 1981:27-38, 53-63 and 67-69, McBride 1984:63-75 and 136-142).

What followed was the biggest manhunt in Arizona's history. The Power boys and Tom Sisson made their father comfortable (he died later in the day), mounted the officers' horses and mule, took plenty of guns and ammunition and rode south towards Redington on the San Pedro River.

From there they worked their way east across south-eastern Arizona, slipping past the posses that criss-crossed the country and finally entering Old Mexico south of Hachita, New Mexico. There on March 8th they surrendered to a U.S. Army patrol that had picked up their trail and crossed the border in pursuit.

At their trial, all three men were convicted of first-degree murder and sentenced to life imprisonment. Sisson eventually died in prison at the age of 86, but the Power brothers lived on. In 1960, 42 years after their conviction, they were released on parole. Nine years later Governor Williams signed their pardons. Tom Power lived until September of 1970, after having told their side of the story, while John spent his last years near Aravaipa, passing on in 1976. Jay Murdock stayed in the Galiuros until the 1950s. Ed Knothe continued to work his gold mine and by 1934 had managed to make a few shipments of sorted, high-grade ore.

The Powers never shipped any ore from their own mine. It passed into other hands and in the early 1930s a few test lots of ore were shipped from there. An Ellis ball mill installed about five miles to the north, near the old Gold Mountain workings, processed about 100 tons of ore (apparently from the Powers Mine) in 1933. The last recorded production in this district dates from 1940. More recent studies by the U.S. Geological Survey have shown a spotty occurrence of gold and silver at the Powers Mine, most assays indicating little more than a trace of precious metals. Other mines and

prospects in the Galiuros have approximately the same values. Historically this district yielded only 163 ounces of gold (Wilson et al. 1983:193-194, Creasey et al. 1981:32-34 and 69-93, Power 1981, McBride 1984).

THE WILDERNESS

Back in October 1932 the Forest Service created the original Galiuro Primitive Area within the existing National Forest. The Primitive Area became the Galiuro Wild Area in 1940, with administration shifting to Coronado National Forest in 1953. Under the 1964 Wilderness Act, the area was redesignated the Galiuro Wilderness in September 1964. A last addition in 1983

incorporated the parklike floor of Rattlesnake Valley, the so-called Galiuro Corridor, into the Wilderness.

The Galiuro Wilderness, now with a total of 76,317 acres, is virtually free of historic or modern intrusions. The most visible links with the past are the old log structure at the Power's Garden, used by the Power family more than 70 years ago, and the Power's Cabin where the shoot-out took place. The latter, with its log walls of Arizona cypress, the shake roof, and rough-sawed door and window frames, stands little changed from its appearance at the time it was originally built around 1905 or 1906. It has recently been rehabilitated and should endure for many more years as a focal point for all who value the history of the Galiuros.

Carr Reef History

William B. Gillespie

Perched high above Carr Canyon a few miles south of Sierra Vista, Arizona, is a prominent band of quartzite cliffs known as the Carr Reef, or simply "the Reef." Now the site of a Forest Service campground, the Reef was formerly the scene of repeated mining ventures. Beginning in the late nineteenth century and persisting, sporadically, into the 1950s, a variety of miners have sought their fortunes on the Reef. Tunnels were driven, the surface quarried, and a series of mills were built to process the abundant ore. In the beginning of the twentieth century, a Post Office was established

and plans for the town of Reef were made. Few found the wealth they hoped for, and for all the activity of the preceding century, the Reef now bears only the healing scars of the past era.

The history of past activities on the Reef has not been told in any detail. Published accounts are few in number and are often of questionable accuracy. For the most part, the enterprises of the past have slipped into oblivion. The pages that follow are an attempt to fill in some of the gaps in the Reef history. Included are

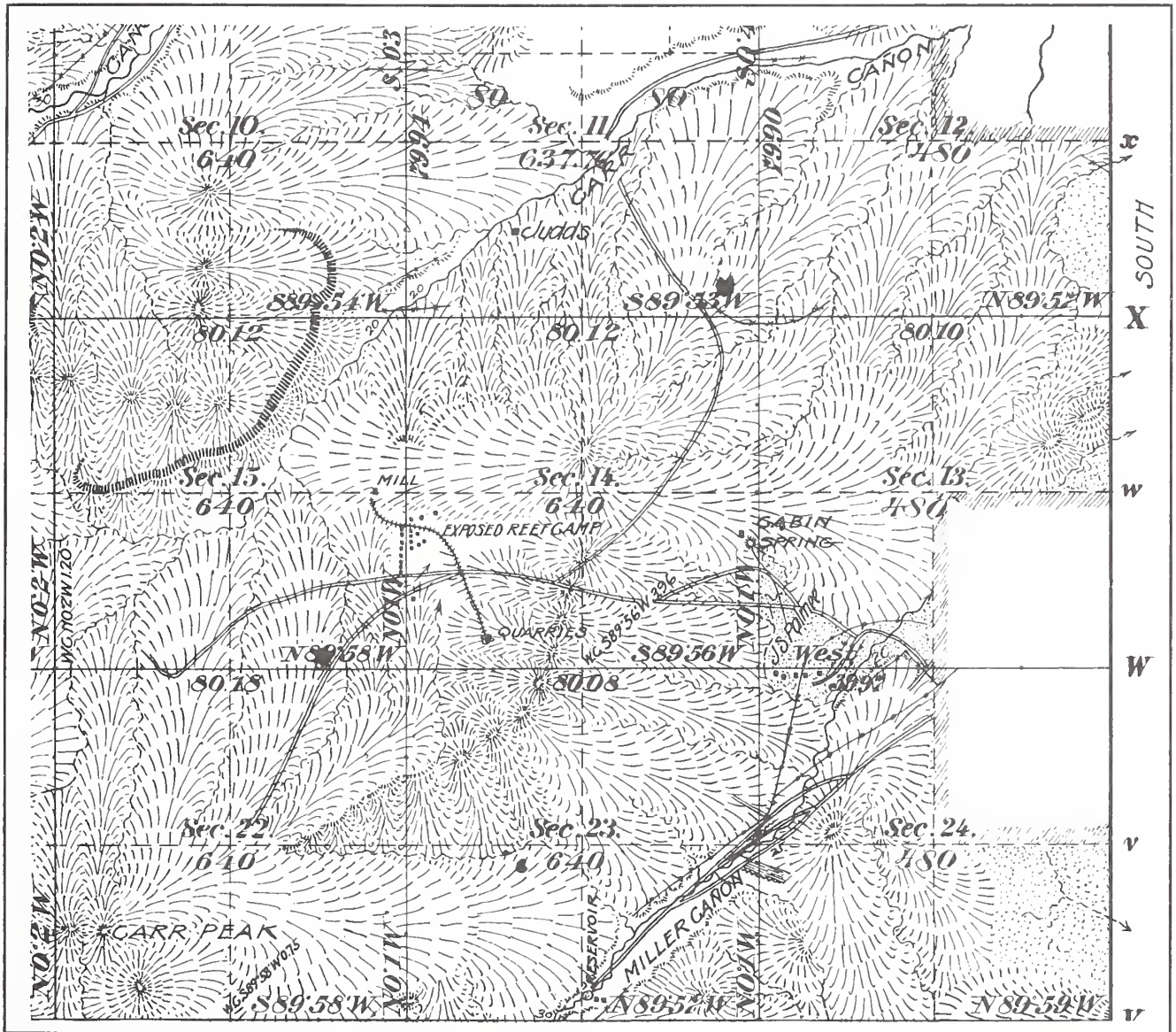


Figure 3. The "Exposed Reef Camp" is near the center of this portion of Contzen's 1906 GLO map. Note the buildings and the rail track between quarries and a mill. Carr Canyon is to the north; Miller Canyon to the south.

discussions of the period before the mining development, including the peak in wood-cutting that occurred around 1880, the gold-mining years, the tungsten-mining ventures, and the history of the Reef Post Offices and postmasters.

BEFORE THE MINES — EARLY YEARS AT THE REEF

The first people to visit the Carr Reef area and to make use of its natural resources were undoubtedly the pre-historic Native Americans who lived in and around the San Pedro Valley. Around 1000 to 500 years ago a number of large villages dotted the northeast base of the Huachuca Mountains, most often situated at the mouths of the canyons that flow from the mountains. Around 1700 the Spanish and the Jesuits found villages of Sobaipuri Indians scattered along the San Pedro River and on all sides of the Huachuca Mountains. In an attempt to establish a stable frontier, the Spanish formed an alliance with the Sobaipuri against the Apaches and other nomadic tribes in the region. Constant skirmishes with the Apaches and their allies led to withdrawal of both the Spanish and Sobaipuri by the mid-1700s. From this time until the late nineteenth century, the Apache became the primary users of the Carr Canyon area.

Despite hostile relationships with the Apache, the Spanish did accomplish some silver mining in the Huachuca Mountains. In 1766 Nicholas de Lafora inspected the region and noted that there were “mines in the adja-



Figure 4. This steam-powered sawmill was used on the Reef around 1900. Note the beargrass-roofed shack in the background. Photo courtesy Arizona Historical Society (AHS #72762).

cent mountains, especially in the Guachuca mountains, which are producing good silver (Kinnaird 1958:107).” Spanish miners probably worked in the southern part of the Huachucas, the portion closest to the *presidio* of Terrenate a few miles to the south in modern-day Mexico. Two places the Spanish evidently worked were in Cave Canyon and Montezuma Canyon, both of which are on the south side of the Huachuca Mountains, three to four miles from the Reef. Here Anglo-American miners in the late 1870s were surprised to find abandoned shafts, mine dumps, and trails indicating earlier mining (*Arizona Daily Star* 1879d, 1879e, and 1879f; *Tombstone Epitaph* 1880a). But the Spanish were on the fringe of the frontier and the risks from the Apaches were very high. Mining and local settlement in the vicinity of the Huachucas probably ceased in the late 1700s and did not resume again until the second half of the 1800s when Arizona had become a territory of the United States.

The Lumber Boom (1877 to 1883)

Although the Huachuca Mountains became part of the United States with the Gadsden Purchase of the 1850s, it was not until the late 1870s that Anglo-American influence became intense. Two events occurred in 1877 that were to have lasting impacts on the southern Huachuca Mountains; the establishment of a new military installation, and discovery, or rediscovery, of rich mineral deposits.

In March of 1877 Camp Huachuca (later changed to Fort Huachuca) was established a few miles north of Carr Canyon. Later that year, prospector Ed Schieffelin visited the camp and, despite warnings that “all he would find would be his tombstone,” headed east across the San Pedro Valley looking for silver. He soon found what he was after, thereby beginning the rush for wealth that would create the town of Tombstone (e.g., Faulk 1972).

The establishment of Tombstone created an extreme demand for timber. Wood was needed not only for construction of buildings, but also to fuel steam engines used in the mining operations, for mining timbers, and for ore-processing mills. Within a year Tombstone went from uninhabited prospect to a town of over a thousand. By 1880 it was one of the largest towns in the West. That year a proposal to build a railroad to Tombstone included an estimate that 150 tons of timber and wood would be transported to Tombstone daily (Myrick 1975). Because Tombstone lacked not only timber, but also water, mills to reduce ore were built along the San Pedro River, about halfway between Tombstone and the Huachuca Mountains (Cook 1987)

To meet the wood demands for this booming town, private entrepreneurs soon set up sawmills along the east front of the Huachucas and the west side of the Chiricahua Mountains. Crews were sent up newly cut roads to tap the large stands of pine and Douglas fir of the highlands. In the Huachucas, the Carr Reef area was to be at the forefront of this activity. What was probably the first and the most productive of the Huachuca sawmills, the Gird/Carr sawmill, was located in Carr Canyon. In the northern Huachuca Mountains, soldiers from Fort Huachuca were also milling lumber, mainly from the mountain slopes south and west of the fort (Smith 1981).

Richard Gird, the original developer of the Gird/Carr sawmill, was an ore assayer and partner to Schieffelin in his Tombstone mining ventures. In 1878, with the mining prospects at Tombstone looking very promising, Gird went to San Francisco to order a new stamp mill and to oversee its manufacture. Gird realized that the construction and operation of his mill would require large amounts of wood. He figured he would guarantee a reliable source by establishing his own lumbering enterprise. While in San Francisco he purchased not only the new stamp mill, but a large sawmill as well. The new sawmill was put on a vessel, shipped around the Baja California Peninsula, taken by steamboat up the Colorado River to Fort Yuma, then hauled by wagons through Tucson to the Huachuca Mountains (Faulk 1972).

The sawmill was set up in December of 1878 and began production in January of 1879. Gird's Tombstone Milling and Mining Company ore-processing mill was soon built and went into production in June of 1879, before any of the other mills on the San Pedro could get started (Fulton 1966).

The sawmill was operated by Gird's brother, William, and John McCloskey. McCloskey and the Girds reportedly made handsome profits supplying the milling operations on the San Pedro and the construction at Tombstone. The focus of their timber-cutting was in "McCloskey Canyon," a place name then used for Carr Canyon. In April of 1880 the sawmill was sold to James Carr who adopted the name Huachuca Sawmill for his operation. Apparently, the name of the canyon went with ownership of the mill; soon after the sawmill was transferred to Carr, Carr Canyon became the preferred place-name for the mill location and McCloskey Canyon slipped into oblivion.

James Carr's Huachuca Sawmill continued to process large amounts of timber. The Gird/Carr sawmill was a large one, using a 60-inch circular blade driven by a

24 horsepower engine and capable of producing 8,000 to 10,000 board-feet per day. By June of 1880 it had produced an estimated 1,750,000 board-feet of lumber, about one-third of what the reserves of the area were estimated to be. At that time Carr employed six mill hands and 25 tree cutters who used 12 yoke of oxen and 30 span of mules to haul wood (*Tombstone Epitaph* 1880a).

While most of the wood milled in the southern Huachucas went for construction and mining timbers at Tombstone and to the mills on the San Pedro, wood also went into the construction of a toll bridge over the San Pedro (Faulk 1972), and to the mining camps at Bisbee and Harshaw (Francaviglia 1982; *Tombstone Epitaph* 1880a).

The lumber business was no doubt helped along when major fires swept through Tombstone, not once but twice during its heyday, first in 1881 and again in 1882. In both cases, lack of water prevented fire fighters from providing more than token resistance to the blazes. The citizens of Tombstone decided it was time to find a more secure and productive water supply. A reservoir was constructed in Miller Canyon, immediately south of the Reef, and a pipeline run all the way across the San Pedro Valley to Tombstone. Another reservoir and pipeline were constructed in Carr Canyon at the north base of the Reef (*Tombstone Weekly Epitaph* 1882; Faulk 1972; Cook 1987). The Huachuca Water Company was successful and the water system still serves the town of Tombstone. By the turn of the century a telephone line was in place connecting Tombstone to the small outpost at the Miller Canyon Reservoir, with a line also going to the Reef mining camp.

By the mid-1880s, the local lumber business was on the decline. Most importantly, the mines of Tombstone and the associated mills began to fade (the San Pedro mills were all closed by the end of the decade). In addition, the southern Pacific Railroad reached southeastern Arizona in the early 1880s. With the coming of the railroad, lumber shipped from California was found to be both less expensive and higher quality. It came to dominate the market, bringing about a marked reduction in the intensity of lumbering in the mountains of southern Arizona (Matheny 1973; Wilson 1987).

A new sawmill was established at the Reef around 1900 when the Exposed Reef Mining Company began its mining and milling operation there. This sawmill (Figure 4) was probably very similar to the earlier Gird/Carr saw. At least three young men — Jose Galbes, Francisco Comacho, and Pablo Telles — listed their occupation as "woodcutter" when the census taker vis-

ited the Reef in June of 1900 (12th Census Schedules). A 1918 map of the Reef also shows a sawmill at the mining camp (Figure 5). However, a series of large forest fires in the early 1900s brought an end to commercial timber operations in the Reef area (*Tombstone Epitaph* 1902, 1906; *Tombstone Prospector* 1904a and 1904b; Wallmo 1955)

MINING ON THE REEF

With the discovery of rich silver deposits at Tombstone, prospectors flocked to neighboring mountain ranges hoping to strike it rich. But despite the prospecting and the intense logging in the vicinity of the Reef, the mineral resources there drew little attention. Gold and silver were finally discovered on the Reef in the early 1890s. As the news got out, prospecting accelerated and mining claims began to be filed. The Reef was to be the focus of recurring mining ventures, most of them of limited success, for nearly 70 years.

The focus of the various mining attempts changed through the decades as the market demands for different metals and minerals changed. Like the Spanish before them, the prospectors of the nineteenth century were mainly seeking silver. Attention shifted to gold in the last years of the century, particularly after the collapse of the silver market in 1893. Both gold and silver were found to be present on the Reef, although neither was particularly abundant.

After efforts to mine gold and silver proved less productive than they'd hoped, miners next focused on tungsten which was present in abundance in the form of the mineral scheelite. Tungsten mining on the Reef had brief periods of success in the 1910s and 1930s, but had its rough times too. In the 1950s an attempt was made to process another mineral, quartz, which is very abundant on the surface of the Reef. Mining on Carr Reef ceased in the late 1950s. Even as recently as 1983, proposals to revive mining on the Reef have been made. However, the Forest Service, in agreement with the majority of local residents, has rejected such proposals in favor of developing the area for public recreation.

The Gold-mining Years: 1893 to 1908

The first record of mining activity directly on the Reef is in July of 1893 when the first claims were made. By 1895 six claims had been filed, all by Peter Connors and Richard Lusk. These were Yellow Jacket, Big Dipper, Little Dipper, White Plume, Wolverine and Golden Plume (Bassett 1980). The first four of these were later patented while the last two remained unpatented.

Figure 5 shows the locations of these and other claims on the Reef.

Lusk was a schoolteacher and naturalist who had moved to Cochise County in 1891 and continued to teach school there and elsewhere in southern Arizona for many years (*Arizona Daily Star* 1934a and 1934b). His role seems to have been that of investor rather than miner. His partner was Pete Connors, a prospector who had wandered the Huachucas for several years, was the "field man" in their venture. Connors was nearly 50 years old in 1893 when the first claims were filed. Alice Walker later described Connors as an old miner, "... an Irishman, well over 6 Ft. and very angular and very drunk when he could get the where with" (Walker n.d.:117). Connors sold his substantial interests in the Reef mines for around \$20,000 dollars, and immediately began to spend it. After renting a car to travel east to impress the folks back home, Connors soon had to borrow money from his sister to make the trip back to southern Arizona. By 1900 he was back on the Reef, apparently working for the Exposed Reef Mining Company (Walker n.d.).

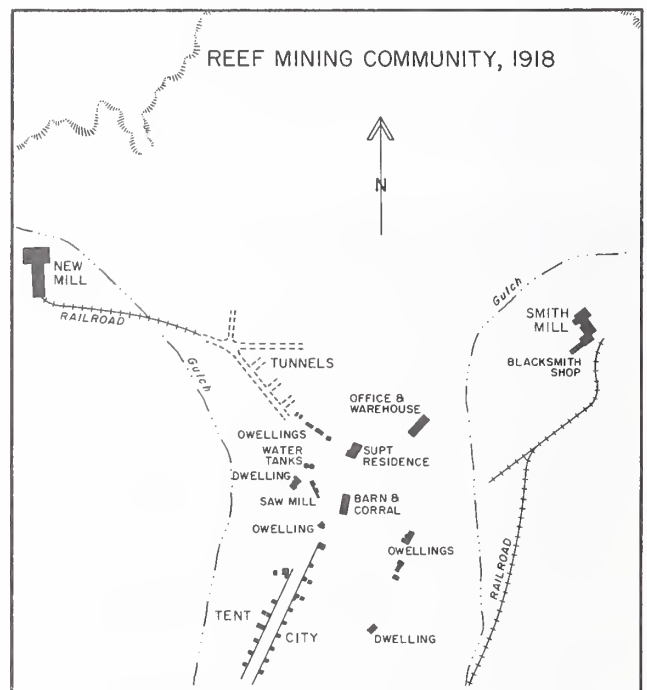


Figure 5. The facilities shown here are from a 1918 map prepared for the Tungsten Reef Co. (on file, Coronado National Forest). The map is dated November 15, 1918, only four days after the Armistice brought an end to World War I and to the tungsten boom.

The Exposed Reef Mining Company was officially incorporated on September 11, 1899, after a group of Ohio businessmen decided to get into the business. The *Tombstone Prospector* (1899) recorded the Articles of Incorporation and identified the officers of the company. The group included three gentlemen from Akron, Willis D. Chapman (President), Pierre J. Boucher (Secretary), and Charles F. Wood; one from Cincinnati, Oscar C. Evans (Vice-President); and an attorney, Charles Bowman, who had recently moved to Tombstone from Tucson. Another gentleman, Orlando B. Hardy, an active southern Arizona mining man/developer, was apparently enlisted to acquire mining properties as a representative of the company. Hardy did indeed begin buying up all the Reef claims from Connors and his associates. Although Hardy reportedly bought the claims for the company, Cochise County records show he retained title of the claims in his own name up until 1903, by which time the Exposed Reef venture was in serious trouble (Bassett 1980).



Figure 6. In 1901 the Reef mining camp consisted of a few scattered wooden buildings. Photo courtesy Arizona Historical Society (AHS #72728).

The Exposed Reef Mining Company planned to build a large, 40-stamp mill directly on the Reef to process large quantities of low grade gold ore that they thought would be easily obtained from the shallow widespread quartz veins. Water and wood were readily accessible, making the venture appear quite attractive. Unfortunately, things didn't work out as planned. Delays put initiation of mill construction off at least a year, in part because the company decided to construct a cyanide plant as well a stamp mill.

A small mining camp sprang up, but work on the mill did not begin until January of 1901. A newspaper account at that time noted that the road was recently completed, the site for the mill graded, and that "a large force are at work getting the large cyanide and crushing machines of the company in place" (*Arizona Daily Citizen* 1901).

The mill was constructed on a hillside at the east edge of the Reef area, near where the present road completes its climb and enters the Reef basin (within the White Plume claim on Fig. 3). Six months and a reported \$100,000 later, the mill was complete and ready for operation (*Tombstone Epitaph* 1901). However, it appears that the mill did not produce as expected. A later newspaper account says it ran only six weeks before shutting down (*Arizona Daily Star* 1903c). An investigation made a few years later by another mining venture suggested that the Exposed Reef engineers



Figure 7. The Exposed Reef Mining Company constructed this 40-stamp processing mill around 1901. Photo courtesy Arizona Historical Society (AHS #72808).

had failed to grind the ore fine enough and did not apply the cyaniding process properly (McDonald 1907).

Supervision of the mill construction and the assaying of ores were the duty of Mark Walker, Jr. Walker was born in Scotland and came to the United States as a child with his father, Mark Walker senior. As a young man in Tucson in the 1890s he worked for the University of Arizona and became an assistant chemist at the Agriculture Experimental Station before transferring to the Mining and Geology Department. In 1896 Walker married Alice Viola Feldman of Tucson and around 1900 brought her and their two daughters, Yetta Helen and Dorothy, to the Reef when he accepted a position with the newly formed Exposed Reef Mining Co. For the 1900 census he listed his profession as "assayer". He left the Reef in 1901 to take a position at the Silverbell Mine west of Tucson. Walker worked on several mining and assaying projects in Arizona and California before establishing his own assaying company in Los Angeles and eventually working as a chemist for the DuPont company until his death in 1931 (Walker n.d.).

Despite the failure of this first milling operation and the departure of Mr. Walker, the Exposed Reef Mining Company persevered and soon began construction of a second mill and cyanide plant, using equipment from the first. This new mill (the "Mill" on Figure 3) was built along the northwest side of the mining area, along the Forest Service interpretive trail that begins in the Reef



Figure 8. Cyanide leaching in large vats was used to recover gold from crushed ore. Photo courtesy Arizona Historical Society (AHS #72780).

Townsite campground. The new millsite was placed at this lower elevation largely because richer ores were discovered in tunnels in the lower, north portion of the Reef area. Rather than haul ore uphill to the initial millsite, it was decided to simply start over with a new mill located next to the most promising ores. Ore from the higher southern part of the Reef was transported down to the new mill along new rail tracks.

Work on the new mill proceeded sporadically through 1902 but still was not completed by the spring of 1903 when the Exposed Reef Mining Company apparently had had enough. On March 12, the company issued a lease to Samuel S. Church of Cincinnati specifying that Church hold the property in trust until a new corporation could be formed to take it over. The lease to Church followed by one day the transfer of the deed to the Reef claims from Orlando Hardy to the Exposed Reef Mining Company. On June 4, 1903, Church made a lease to a newly created corporation named the Reef Mining Company (the descriptive label "Exposed" was dropped) which agreed to pay off up to \$45,000 of the Exposed Reef Company's debts and to share any royalties from future earnings (Bassett 1980).

With this financial revival, work on the new mill picked up again. Newspaper accounts in July and September tell of as many as 60 men working on the property and of new machinery arriving by railroad and being transported up the Reef from Todd's Ranch by W.H. Kane, a local teamster (*Tombstone Prospector* 1903; *Arizona Daily Star* 1903c and 1903d). At this time a tramway to the northern mill was also built. By the end of No-



Figure 9. Ore was transported to the stamp mill by ore carts on rails. Photo courtesy Arizona Historical Society (AHS #72806).

ember, the new operation was able to start up the new mill and to celebrate with a Thanksgiving dinner for all the workers (*Arizona Daily Star* 1903f). W.P. Boag was now the General Manager of the Reef Mining operation and was apparently in charge of the mill construction.

The optimism that accompanied the opening of the mill in late 1903 was short-lived. Mill operations were halted almost as soon as they began. By April of 1904, local papers were again reporting that work at the mill would "begin soon" (*Tombstone Prospector* 1904a). By May eleven employees had filed a lien on the mine property for wages which evidently had by this time been replaced with promises. The president of the company, Oscar Evans (formerly Secretary of the original Exposed Reef Mining Company) visited the Reef, told unpaid miners that the payroll was on its way, then quickly returned to Cincinnati (*Tombstone Prospector* 1904b).

By June conditions at the Reef were described as "gloomy" and "distressingly quiet" (*Tombstone Prospector* 1904c and 1904d). Summer also brought a major forest fire to the southern Huachuca highlands threatening Carr Reef, the water works in Miller Canyon, and the town of Palmerlee before a force of soldiers and civilians succeeded in containing it (*Arizona Daily Star* 1904b). Although work on the new mill must have been nearly complete, the Reef Mining Company operations ground to a halt. By September, a Mr. Chamberlain was reported as being in charge of the property (*Tombstone Prospector* 1904e). Newspaper reports from the Reef come to a halt at this time, probably reflecting a lack of newsworthy events.

The next action reported from the Reef is in January of 1906 when P.J. Warnekros and S.P. Gallen, two Tombstone residents, laid claim to five of the Reef mining claims, stating that they had been abandoned by the Exposed Reef Mining Company (Bassett 1980). By summer, these two gentlemen had joined with J.C. Elliot of Tucson, and under the name of the Ellwell Company had 25 men working the mines and preparing to start up the north mill and cyanide plant. In May of 1906 all available workers were battling another major forest fire, the third in five years (*Tombstone Epitaph* 1906a, 1906b and 1907).

In June of 1907, J.N. Curtis, a successful mine developer and Benson area rancher, took over all of the Reef mine claims. The Sitruc Mines Company (Sitruc is Curtis spelled backwards) was formed and a diligent effort was begun to develop the mines. By summer Curtis had a crew working at the mine and had hired a

geologist and assayer, Jesse McDonald, to prepare an assessment of the geology and economic potential of the mines (McDonald 1907). He also hired the well known Tucson surveyor Philip Contzen to make an official Mineral Survey (Contzen 1907) so that the claims could be legally patented for the first time. Contzen's map of the Reef claims, based on his survey made in early September, 1907, shows two houses and a boarding house at the camp, and a railroad leading to the west mill. The Mineral Survey also documents improvements totaling \$8,400 made by Curtis, more than the \$500 per claim required to make a patent. Most of the expenditures were incurred in developing the main tunnel on the north side of the Reef.

Based on Curtis's work, a patent for nine Reef claims was issued for the first time, although it was not formally filed until May 14, 1909 (Bassett 1980). Despite the optimistic start, the Sitruc Mines Company does not appear to have lasted long. Operations may have ceased before the end of 1907 without achieving successful results.

The Reef lay dormant from 1907 until 1916. In March of 1911, Tucson businessman and investor Albert Steinfeld bought the patented claims for slightly more than \$10,000 at a public auction at the courthouse door in Tombstone. The next time miners approached the Reef, they had a new quarry in mind: tungsten.



Figure 10. These laborers at the Exposed Reef mill appear to be ready for lunch. Photo courtesy Arizona Historical Society (AHS #72723).

The Tungsten Boom: 1916 to 1918

In 1916 the price of tungsten was soaring, in large part because of the armament business associated with World War I. Tungsten became a crucial element in making high-grade steel alloys, used both for machine tools resistant to high temperature and for armor plating. A miner named J.P. Steele had worked on the Reef in the first decade of the twentieth century and recalled the abundance of an unknown mineral in the ore. He suspected it might be the mineral scheelite, an important ore of tungsten, and went to O.T. Smith, miner and assayer familiar with tungsten. Smith and Steele determined that the abundant material on the Reef was indeed rich in tungsten and in April of 1916, bought the claims from Albert Steinfeld for a reported \$40,000 (Royer 1923).

In 1916 a new mill, known as the Smith mill, was built at the site of the original stamp mill and cyanide plant at the east side of the Reef. By December the first shipments of tungsten concentrate were made. From then through April of 1918 at least 63 tons of tungsten concentrate worth nearly \$100,000 were shipped from the Reef. An assessment report prepared a few years later indicates that additional, unrecorded shipments may have been made, and that a large amount of concentrate was probably stolen or pilfered — at nearly a dollar per pound, the concentrate was a lucrative commodity (Royer 1923).

In May of 1918, Smith sold the claims, no doubt for a handsome profit, to the Tungsten Reef Mines Company, a new company headed by A.J. Clark. The new owners expanded the Smith mill and purchased a reported \$30,000 worth of new equipment for an even larger mill which was begun at the west mill site. The Tungsten Reef Mines Company produced a new map of the Reef which shows a superintendent's office, another office and warehouse, blacksmith shop, saw-mill, several dwellings, the two mills and a "tent city" laid out along a street.

As with previous corporate ventures on the Reef, the Tungsten Reef Mines had an optimistic beginning, followed quickly by failure. The management reported that the onset of winter weather forced curtailment of work before the new mill could be operated. More importantly, November of 1918 brought an end to the war and a rapid decline in tungsten prices. By the time warm weather arrived, the demand for tungsten was too low to justify starting operations again. Despite an abundance of ore ready to mill and new machinery on hand, the Reef lay silent and was to remain so for more than a decade.

The Second Tungsten Era: 1934 to 1956

In July of 1934 John J. Seeman, then a California resident, obtained an option from the Tungsten Reef Mines Company to work the claims. For a bond and promise of non-liability, the Tungsten Reef Company was happy to have Seeman process ore for tungsten. Over the next seven years, Seeman milled thousands of tons of ore and shipped nearly 100 tons of tungsten concentrate down the Reef road, recently improved by the Civilian Conservation Corps. In 1941 Seeman bought the mining claims outright for only \$4,660 in a sale to satisfy a judgement against the company. Operations halted in 1942 (State of Arizona 1941 and 1942).

Seeman passed ownership of the claims on to his son, Lewis H. Seeman, and Lewis's wife Hazel in 1949. Lewis was interested in starting work again but apparently didn't do so until later. In 1952 he leased his operation to a company called the Minerals Development Corporation of Dallas, Texas. This firm bought parts at an old gold mine and mill near Wickenburg and began moving them to the Reef (State of Arizona 1952 and 1954).

There is no indication that the initial Minerals Development Corporation succeeded in milling much if any tungsten ore before January, 1954, when new stockholders had taken control. The new group intended to mill quartz itself, taking advantage of the abundant quartz tailings and mine debris easily available on the Reef. Quartz is so plentiful that the main road on the Reef has been surfaced with discarded quartz. They apparently secured contracts from oil refinery companies to deliver quartz milled to the size of rice grains. The oil companies sought quartz to use as a catalytic agent in refining gasoline (*ibid.*).

Minerals Development Corporation had begun clearing ground for a new mill by January of 1954 and apparently completed it sometime around early summer. In March, 25 employees were reported to be on the job, building the new quartz-processing mill. They also intended to put up another, smaller mill for processing tungsten, but evidently did not succeed in doing so.

By September, 1954, Lewis Seeman had cancelled the lease agreement with Minerals Development Corporation for failure to comply with the terms of the agreement. Apparently the corporation had agreed to pay him a certain amount in royalties by this time and had not done so. The Federal Government was also pressing the corporation for unpaid taxes and by August had seized their property. A sale was initially scheduled for August 8 but was rescheduled because of insuffi-

cient bids at the first auction. About this same time the oil companies were also cancelling orders with the corporation because of slow deliveries. The company processed only a small amount of quartz and made only one shipment (about 375 tons) before shutting down (State of Arizona 1954).

With Minerals Development Corporation gone, Lewis Seeman and his brother, George, went back to their small-scale tungsten operation. In 1956 they were shipping out around ten tons of scheelite concentrate a week. They would mine a bit with a power shovel then mill what they had in a small (one ton per hour) mill (State of Arizona 1956).

Lewis Seeman entertained thoughts of selling the operations, for the right price, but didn't do so before government price supports were withdrawn. This government policy change in 1956 effectively brought tungsten mining to a close throughout the west. Production was at an all time high in 1955 and in 1956 there were 600 producers active in the United States. By 1958 the number was two; without government price supports, the vast majority of companies were unable to compete with foreign producers. The price per short ton was \$63 before 1956 but only \$16-19 in the 1960s (Hobbs 1969). The Seemans suspended operations on the Reef in September, 1956.

This brought an end to mining on Carr Reef. Lewis Seeman died three years later in 1959. Using Land and Water Conservation Funds, the Forest Service purchased the patented Reef claims from Lewis's widow, Hazel, in 1970. This acquisition was made for the purpose of providing recreation opportunities for the public. A campground, appropriately called the "Townsite Campground" now exists on the site of the old Reef mining camp. A number of interpretive signs detailing the history of mining on the Reef have been installed in and around the campground. In addition, a one-half mile interpretive trail through the mining area and past one of the old millsites, has been developed using old mine roads.

THE REEF POST OFFICES AND POSTMASTERS

At the turn of the century prospects at the Reef were promising enough to merit the establishment of a U.S. Post Office. The Exposed Reef Mining Company was developing the mine claims and was starting construction of a large state-of-the-art mill for processing ore. With the future looking bright, the Reef Post Office was established on January 7, 1901. Although its name was changed twice (to Palmerlee and later Garces), the post office continued in operation until 1926.

There is some question about where the Reef Post Office was located. Several published accounts (e.g., Musbarger 1955; Granger 1960; Sherman and Sherman 1969) suggest that the post office remained in the same location, presumably the Reef, throughout its history. There are abundant reasons to believe that this is not so. The Reef Post Office was probably located at the Reef for less than one year. After that time, it evidently was located at lower elevations along the eastern front of the Huachuca Mountains.

The Reef post office was first established just as the Exposed Reef Mining Company began construction of its large processing mill. The first postmaster was Mark Walker Jr., the field supervisor for the company's Reef operations. As discussed above, Walker left the Reef in 1901 to take a position at the Silverbell Mine west of Tucson. On August 28, 1901, William E. Holmes succeeded Walker as Reef post master. Holmes, an ex-cattleman who had become involved in mining at Bisbee, served only about three months before he, too, left the Reef. Later he became one of the principal mine developers at the Turquoise District in the southern Dragoons, where he was president of the Leadville Mining Co.

Elizabeth Rowland Spence Sampson Todd became postmistress of the Reef Post Office on December 2, 1901. It is probably at this time that the Post Office was moved from the Reef. According to Hein (1983), one of Mrs. Todd's daughters recalled that the Post Office at this time was a curtailed-off portion of the living room at the Todd Ranch, located in Carr Canyon just below the Reef (marked as "Judd's" (?) on Figure 3). Mrs. Todd handled mail for the Reef miners and mill workers, as well as for ranchers and farmers in the area.

Mrs. Todd sounds like an interesting person. Born in Yorkshire, she came to the United States alone, at age 19, and ended up in Bisbee married to a miner, Emory Sampson. The Sampsons had three children in short order before he was killed around 1898. Soon after, Elizabeth married Robert Todd, a resident of Carr Canyon. When she became postmistress in 1901, Elizabeth was 36 years old with four children, ranging in age from one through seven. In the next six years Elizabeth and Robert Todd had three more children, bringing the total to seven. No doubt they made up a sizeable portion of the attendees of the one-room schoolhouse on the south side of lower Carr Canyon. At the time of the 1910 census, the schoolteacher, Emma Greer, was living with the family at the Todd Ranch.

Mrs. Todd was reportedly an avid reader and education supporter, evidenced by the fact that at least two of her daughters went on to school at the Tempe Normal School (now Arizona State University). Robert Todd was an accomplished horticulturist. The Todd Ranch reportedly at one time had 3,000 fruit trees, mainly apples and pears (Hein 1983). He sold fruit from his orchard throughout the upper San Pedro Valley and hauled freight on the road up the Reef escarpment.

Robert Todd died in 1922 at the age of 66. Three years later Elizabeth passed ownership of the property on to her oldest son, Emory Sampson, and son-in-law Pete Haverty, who had married Margaret Sampson, her second daughter. The family held the ranch until 1929 when the onset of the Depression forced them out of the cattle business and off the ranch. The Todd Ranch eventually became the Carr Canyon Ranch of Ila and John Healy who built several new buildings and operated it as a dude ranch. After the Healys passed away, the property became part of the Coronado National Forest.

Mrs. Todd ran the Reef Post Office for slightly more than two years. On December 4, 1904, Joseph S. Palmerlee became postmaster and the name of the post office was officially changed from Reef to Palmerlee. Almost certainly the Post Office location was moved from Todd's Ranch in Carr Canyon to Palmerlee's house and store in lower Miller Canyon. Like Mrs. Todd, Palmerlee also apparently moved to the area from Bisbee. There he had been an electrician at the Copper Queen. By the time of the 12th census (June of 1900) he was residing in the Miller Canyon area and still listed his profession as electrician. In 1904, when he became Post Master, he was General Manager of the Huachuca Consolidated Mining Co. and was doing preliminary work on claims farther up Miller Canyon. The Post Office undoubtedly served mining developments in Miller Canyon and local ranchers as well as the Reef. The collapse of the Reef Mining Company in 1904 may have been a contributing factor in the move of the Post Office from Carr Canyon to Miller Canyon.

Palmerlee was already established by the time he became Post Master. A July 1904 newspaper notice (*Arizona Daily Star* 1904b) remarked that a forest fire burned within 100 feet of the Huachuca Water Co. and within a mile and a half of "the town of Parmellee" (he was evidently not well enough established for the *Daily Star* to spell his name right, however). It's not clear what all was present at the "town of Palmerlee" and how large it was. The Shermans, in their 1969 book

on the "Ghost Towns of Arizona," state that "Palmerlee reported having a hundred inhabitants, a florist, meat market, second-hand merchandise shop, boarding-house, school, and other concerns." This description probably does not pertain to any single settlement, but rather to the entire east front of the Huachuca Mountains then served by the Palmerlee Post Office.

Phillip Contzen's 1906 General Land Office township map (Figure 3) and survey notes indicate only a few houses and stables at Palmerlee's — not much of a "town." The Reef at this time, when J.N. Curtis was starting his operation, featured a boarding house, a bunk house, and a frame house as well as the west mill. "Palmerlee's Ranch" is marked on the 1912 Coronado National Forest map, but is absent from later editions. A 1919 agricultural claim (Rodgers 1919) shows Palmerlee was still a resident at that time. This claim noted that Palmerlee had 30 to 40 acres of orchard, raised a small number of "dough-faced cattle", and "has ample buildings, household goods, teams etc., to make a comfortable home" (ibid.).

The location of Palmerlee's store can be reconstructed from Philip Contzen's (1906) General Land Office survey of the township (Figure 3). Contzen's map shows "Palmee's" located on the north side of Miller Canyon Creek in the open lower part of the canyon on what is now Forest Service land. However, Contzen evidently made an uncharacteristic one-half mile error in his survey of lower Miller Canyon. Review of his field notes shows that Palmerlee's was erroneously mapped one-half mile west of its actual location. Palmerlee's Miller Canyon holdings eventually were owned by Nick Gregovich (for whom the present community of Nicksville is named), and in 1974 became part of the Coronado National Forest through a land exchange.

On April 11, 1911, the Post Office was moved again to the town of Garces and Richard M. Johnson named postmaster. Garces was a little over a mile east of Palmerlee, about three miles east of the Reef, just east of the present Highway 92. This was on the south side of the Miller Canyon Creek east of where it emerges from the canyon. Garces was named, at least indirectly, for Francisco Tomas Garces, the first Franciscan friar at San Xavier del Bac (from 1768 to 1779). Garces was later martyred by the Yuma Indians when he tried to establish a mission on the lower Colorado River. The post office was named directly for Garces National Forest (Theobald and Theobald 1961). The Garces National Forest had been established in 1908, combining the former polysyllabic Forest Reserves of southern Arizona — the Huachuca, Baboquivari, and Tumacacori — into a single Forest. Ironically, less than

a week after the Garces Post Office was formally established, the Garces National Forest ceased to exist: by proclamation of April 17, 1911, it was combined with the Coronado National Forest and its name discontinued (Tucker 1992). The Garces Post Office lasted until May 24, 1926. The community of Garces is on Forest Service maps in 1912, 1918, and 1922 editions, but is gone by the 1937 edition. The closing of the Garces Post Office in 1926 appeared to end the series of small post offices located along the east front of the Huachucas, beginning at the Reef in 1901. However, in the early 1990s the Hereford Post Office opened at a new facility located less than a mile from the old Garces Post Office.

SUMMARY

The history of Carr Reef has centered around mining and a long series of ventures hoping to make a profit from the mineral resources there. Many people took a stab at it, but few came away with the wealth they'd hoped for. It's interesting that the most successful miners seem to have been the small-scale operators — people like Smith and Steele, and the Seeman family. Others who profited were the lone opportunistic

investors, like Albert Steinfeld, who bought the property as one company failed, and sold it for four times the purchase amount the next time the Reef attracted the attention of miners. Virtually all of the bigger operators, such as the Exposed Reef Mining Company, the Reef Mining Company, the Sitruc Company, the Tungsten Reef Mining Company, or Minerals Development Corporation, came away with less than they brought. There is a recurring theme with the bigger companies: investors make sizeable monetary contributions, optimistic plans are developed, equipment is purchased and brought to the Reef, newspaper notices report that things look promising, dozens of men are at work, and operations should begin in a week or two. Several months later operations have been a bust, the company is broke, the managers have left for other jobs, but new investors are in the wings, ready to step in and make a fortune.

The story of mining on the Reef is probably typical of many small mining areas in Arizona. Most people are familiar with big successes, like Tombstone, Bisbee, or Jerome. But these are the exception rather than the rule. There are far more small mining areas like the Reef where miners found only modest success.

Kentucky Camp

James A. McDonald, William B. Gillespie
and Mary M. Farrell

INTRODUCTION

The American public has a seemingly endless fascination with the history of mining in the West. Tales of hardship and perseverance, and of fortunes won and lost, offer a multiplicity of meanings for those who believe Santayana's proposition that those who are ignorant of history are condemned to repeat it (Santayana 1905:284).

At Kentucky Camp, the Coronado National Forest has a unique opportunity to satisfy this interest in mining, and to extract meaning from history. Constructed by the Santa Rita Water and Mining Company early in the twentieth century, the site is one of the Forest's best-preserved examples of an historic mining camp.

The Forest Service has seized this opportunity and begun a long-term program of research, stabilization and interpretation to make Kentucky Camp "a living part of our community life and development (PL 89-665, Section 1(a)(2)," as encouraged by a seldom-cited, but nevertheless critical, section of the National Historic Preservation Act. This chapter is a summary of the work to date, and a look toward the future. We will begin with some descriptive background.

THE KENTUCKY CAMP HISTORIC DISTRICT

Kentucky Camp is located on the eastern slope of the Santa Rita Mountains, approximately 35 miles southeast of Tucson (Figure 11). Nominated to the National Register of Historic Places in 1994, Kentucky Camp is

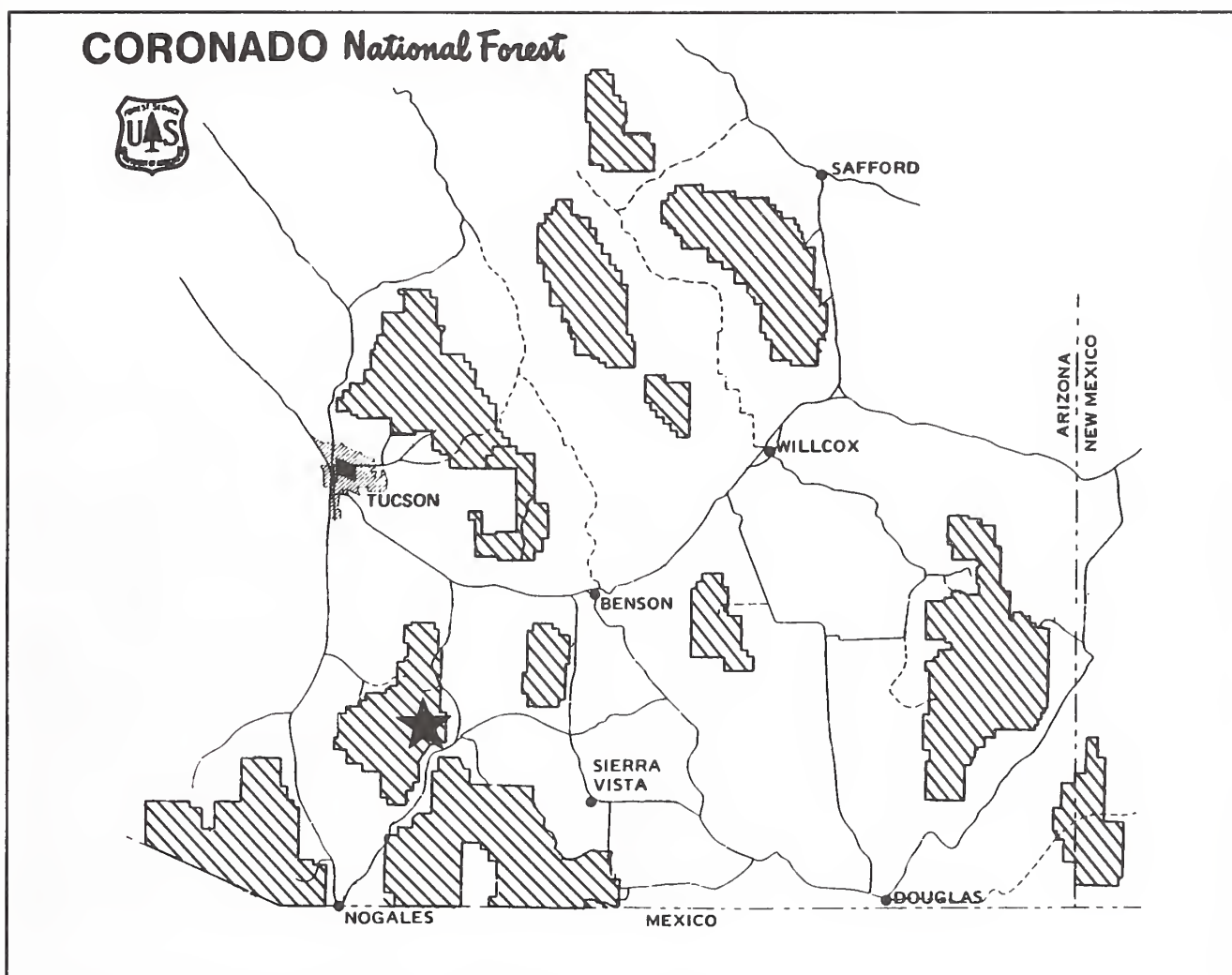


Figure 11. Location map, Kentucky Camp Historic District. One inch equals approximately 28 miles.

an Historic District composed of buildings, structures and archeological sites related to hydraulic placer mining (Farrell et al. 1994).

Gold-bearing gravels are found in late Cenozoic alluvial deposits. The source of the gold is in Paleocene veins of quartz that intruded Mesozoic rocks in the vicinity of Granite Mountain, about two miles northwest of Kentucky Camp (Farrell and others 1994; Cox 1994; Schrader 1915).

Elevations in the Historic District range from 5100 to 5800 feet. Most of the District lies within the Madrean oak woodland vegetation type (Figure 12). Lower elevations are characterized by an oak/savanna vegetation.

Average annual rainfall is about 20 inches, with over 50 percent of it falling in July, August and September, and 25 percent during the winter. Although streams in the southern portion of the District (the Gardner and Casa Blanca Canyon drainages) are fed by rain and snow from the higher elevations of the Santa Ritas, there is no permanent surface water.

Despite the lack of permanent water, the eastward-sloping mountain pediment of the Historic District is dissected by steep-sided gulches and washes up to

100 feet deep. One such drainage is Kentucky Gulch, the location of Kentucky Camp proper (site AR 03-05-02-377).

The most obvious features of the camp are five adobe buildings: a collapsed two-room barn, two three-room cabins, a two-room assay office, and a ten-room hotel (Figure 13). Identification of the latter two buildings was made by Mr. Gail Hummel whose family acquired the property and used it as a ranch following the end of mining operations. Also present in the site are rock retaining walls and a central basin that may represent a pond.

Interior and exterior walls of all buildings are made of adobe bearing on earth or stone foundations. Exteriors are unplastered and interiors (except for the barn) are covered with fine sand plaster of exceptional quality. Ceilings were tongue-and groove or canvas. Windows were two-over-two double hung units, and remaining doors are all four-panel wood. The hotel and central cabin had wrap-around porches.

The barn is a two-room structure of rectangular plan, excavated partially into the slope of the bench (Figure 14). The gabled roof collapsed some years ago, along with substantial portions of the walls.



Figure 12. General view of Kentucky Camp, AR 03-05-02-377, to northeast. From left to right, Cabin C, the hotel and the assay office are visible. Kentucky Gulch is in the foreground, with the mine tailings of site AR 03-05-02-483 visible as hummocks in the bottom of the gulch. Photo by Richard W. and Florence B. Lord.

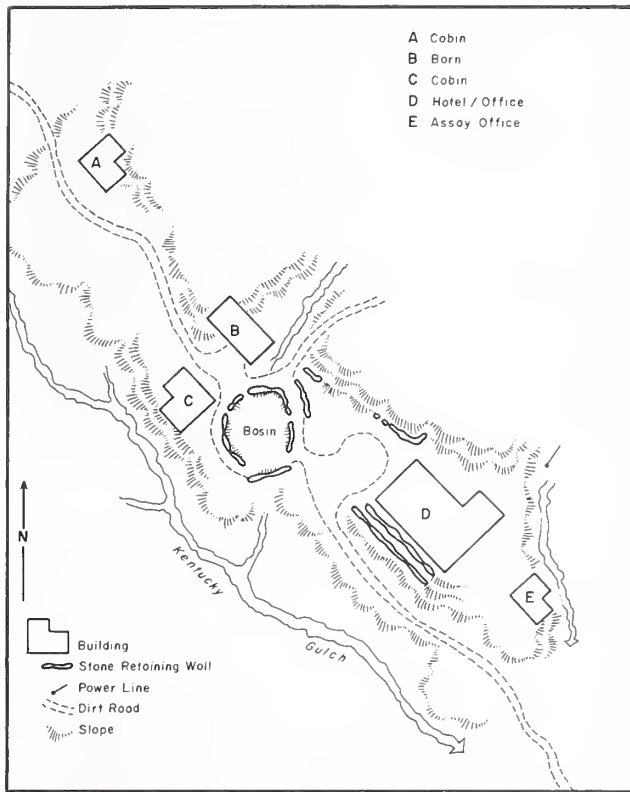


Figure 13. Plan view of Kentucky Camp [after Ryden's (1990) "Site Plan"]. The ordered arrangement of buildings reflects the planning characteristic of the Santa Rita Water and Mining Company venture.

Both cabins are three-room structures with L-plans and gable roofs (Figures 15 and 16). The barn has a hipped roof (Figure 17). Unlike the other buildings, which have wood tongue-in-groove floors, the assay office has a concrete floor. The southern room has a masonry bench against one wall, and a concrete pan draining into a pit against the opposite wall (Figure 18). While the identification as an assay office is tentative, the building's industrial function is evident. The specific nature of the processes conducted within is unknown, but soil in the bottom of the pit has yielded traces of gold and silver and the layout is similar to that of a gold processing facility still in operation in Sonora, Mexico (Orrell 1994). Another indication was provided by the presence of ceramic molds containing slag adjacent to the building. These may have been used in the process of separating gold from gold amalgam, although they do not resemble common retorting equipment (e.g. Ariz. Bur. of Mines 1961: Figure 14).

The hotel is the largest building at the site. Containing ten rooms, it has an L-plan and a hipped roof (Figure 19). While most of the rooms are plastered, the two central rooms on the south side have been painted in decorative panels (Figure 20). The room at the southeast corner has a substantial brick fireplace (the cabins apparently contained only stoves) and there is evidence of shelving throughout the rooms on the south side.

The bottom of Kentucky Gulch in the vicinity of the camp is characterized by a topography of low hummocks (site AR 03-05-02-504). These represent small-scale placer mining which characterized the Greaterville Mining District (within which Kentucky Camp is located) in the 1870s and 1880s. They extend approximately 3/4 mile along Kentucky Gulch. They are typically up to four feet high and 20 feet across and are adjacent to pits of comparable size.

Although the Kentucky Camp buildings are the most prominent features of the Historic District, its heart is actually a water system (site AR 03-05-02-428) and associated hydraulic pits (site AR 03-05-02-500). Designed to capture water from the streams at the southern end of the Historic District, the water system is a complex of features including dams, intakes, ditches, pipelines, penstocks, tunnels and valves (Figures 21 and 22). Approximately 8.5 miles in length, the system contoured across slopes and spanned valleys and small canyons. It collected water from Big Casa



Figure 14. East end of the Kentucky Camp barn. The collapsed roof was acting as a "sail", causing the central partition wall to lean, and was removed by subsequent stabilization efforts. Photo by Jim McDonald.



Figure 15. Cabins A (foreground) and C (background), probably the residences of company managers or supervisors. Photo by Richard and Florence Lord.



Figure 16. Cabin C (left center) and barn (right). Workers have removed the damaged roof and braced the walls. Photo by Richard W. and Florence B. Lord.



Figure 17. General view of Kentucky Camp, looking west. From left to right the assay office, hotel and Cabin C are visible. Photo by Richard W. and Florence B. Lord.



Figure 18. Interior of assay office, showing concrete tub features likely used to process gold. Photo by Richard W. and Florence B. Lord.



Figure 19. Hotel, with the assay office visible behind the far left corner. Photo by Richard W. and Florence B. Lord.



Figure 20. Interior of the hotel, showing decorative panels on the walls. Photo by Jim McDonald.

Blanca, Gardner and Cave Creek Canyons, and transported it to placer gold deposits in Boston Gulch (Figures 23 and 24).

Water was diverted from streams via stacked-rock diversion dams at points where bedrock outcropped at the surface and the stream channel was not incised. On a tributary to Gardner Canyon, an earth and rock structure known as "Stetson's Dam" formed a reservoir. The dam is about 100 feet long and ten feet high. It would have created a pool less than an acre in area.

The water system used about 5.5 miles of open ditches. Ditches were hand-dug, three to six feet in width and one foot deep. Gradients average approximately 0.25 percent.

The ditches passed through two tunnels. One connected the ditch in Big Casa Blanca Canyon to the rest of the water system. A second cut off a long spur of Dead



Figure 21. Water system, AR 03-05-02-428, looking downstream from the beginning of the Gardner Canyon ditch. Photo by Richard W. and Florence B. Lord.

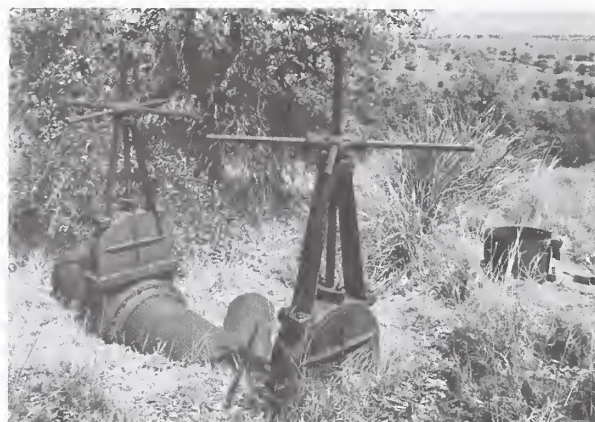


Figure 22. Water system distribution valve at Boston Gulch. Gates within the pipe distributed water between outlets leading to the hydraulic pits. Photo by Richard W. and Florence B. Lord.

Horse Mesa, saving about 1/2 mile of ditch construction. The Gardner Canyon tunnel is 925 feet long, the Dead Horse Mesa tunnel is 300 feet long, and both are about 3 feet wide and 6 feet high.

Pipes traversed major drainages and valleys along the water system, and delivered water to the hydraulic pits. Four different sizes — 24 inch, 20 inch, 15 inch and nine inch — were used. Sizes decreased, and pressure increased, in the direction of the hydraulic pits. No pumping was required anywhere along the system and more than 90 feet of head was available for distribution to the pits when the final section of pipe was filled with water.

Valves at the downstream (Boston Gulch) end of the pipeline distributed the water to the placer pits. Two metal gates placed on the 20 inch pipe distributed water between outlets leading to the pits, where the pressure of the water was used to wash away overburden and sluice gold-bearing gravels.

Seven hydraulic pits testify to the effectiveness of the system for working the gravels. All are located on terraces and benches along a 3/4 mile stretch of Boston Gulch. In general, the pits have steeply-sloping sides and flat floors ten feet to 15 feet below the adjoining ground surface (Figure 25). All were excavated far enough from the gulch to leave a balk at least 15 feet wide between the pit and the drainage. Each pit has one or two outlets through the balk for removing and sluicing the terrace gravel.

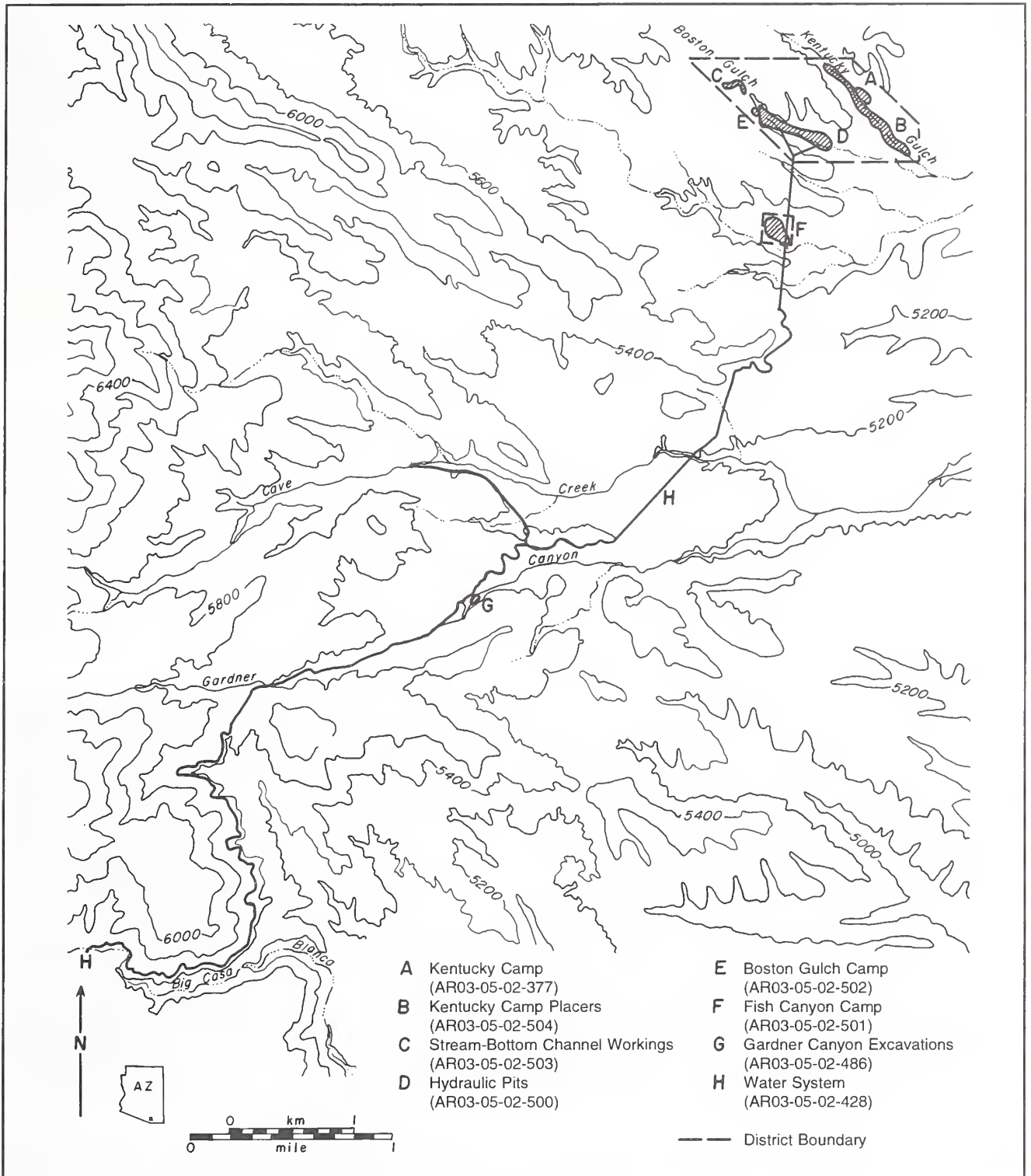


Figure 23. Location map, Kentucky Camp Historic District sites.

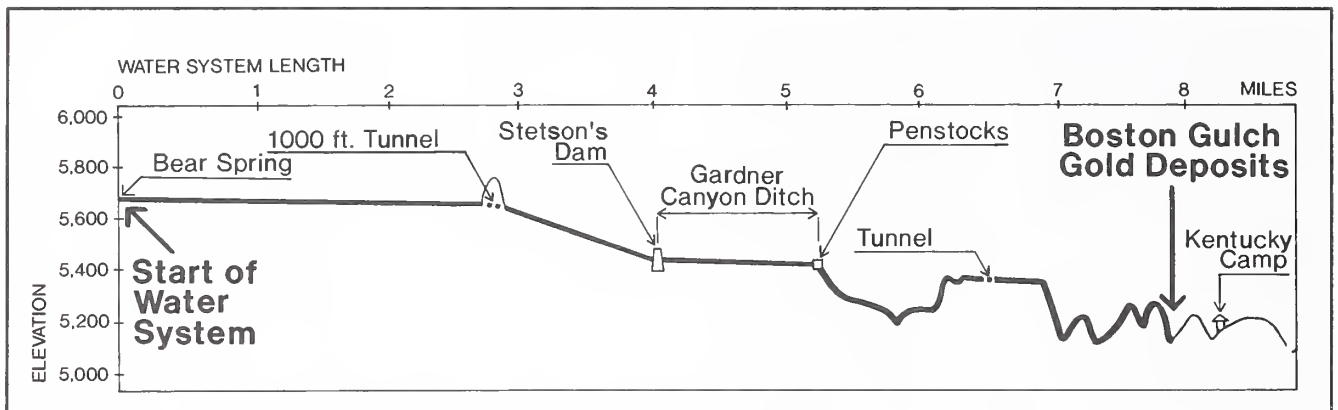


Figure 24. Water system profile. Despite some dramatic changes in elevation, the average gradient for the water system was 0.25 percent, close to optimum for a hydraulic system.

Also present is an area of placer tailings and worked gravels within the drainage of Boston Gulch itself (site AR 03-05-02-503). Artificially-sorted terraces of gravel and sands are distributed over an area about 1,000 feet long and 30 to 50 feet wide. Larger rocks are stacked along the banks in linear rows. The relationship of these features to the construction and operation of the water system and hydraulic pits is uncertain (see below).

While the buildings at Kentucky Camp proper are believed to represent the residences of the manager

and supervisors of the mining enterprise, camps along the water system and at Boston Gulch are believed to have been occupied by those actually engaged in construction and operation of the water system and mine. The two known camps (sites AR 03-05-02-501 and -502) are characterized by scatters of historic trash of early twentieth century vintage. One (site -502; Figure 26) may also contain the remains of a collapsed chimney. Lesser artifact scatters occur elsewhere along the pipeline and may reflect even more ephemeral residences.



Figure 25. Hydraulic pit, site AR 03-05-02-500. Part of the "splendid results" of hydraulic mining at Kentucky Camp. Photo by Richard W. and Florence B. Lord.



Figure 26. Boston Gulch Camp, AR 03-05-02-502. The rock concentration may be a collapsed chimney. Laborers evidently had much less substantial accommodations than managers. Photo by Richard W. and Florence B. Lord.

Finally, some features of the Historic District are enigmatic. Four parallel trenches and associated ridges of excavated material (site AR 03-05-02-486) lie on the floor of Gardner Canyon, a short distance downstream from Stetson's Dam. They are up to 200 feet long and ten feet deep. One of the trenches has a stacked-rock retaining wall along one face. The trenches lie outside of the placer deposits and are not likely to represent mining. They may represent preliminary work on a larger dam that was contemplated

for the water system. No artifacts were observed at this site.

HISTORY AND SIGNIFICANCE OF KENTUCKY CAMP

John P. Wilson (this volume) has provided a background to the Kentucky Camp story, calling attention to the important role of capital and cheap transportation in the development of the Coronado National Forest's

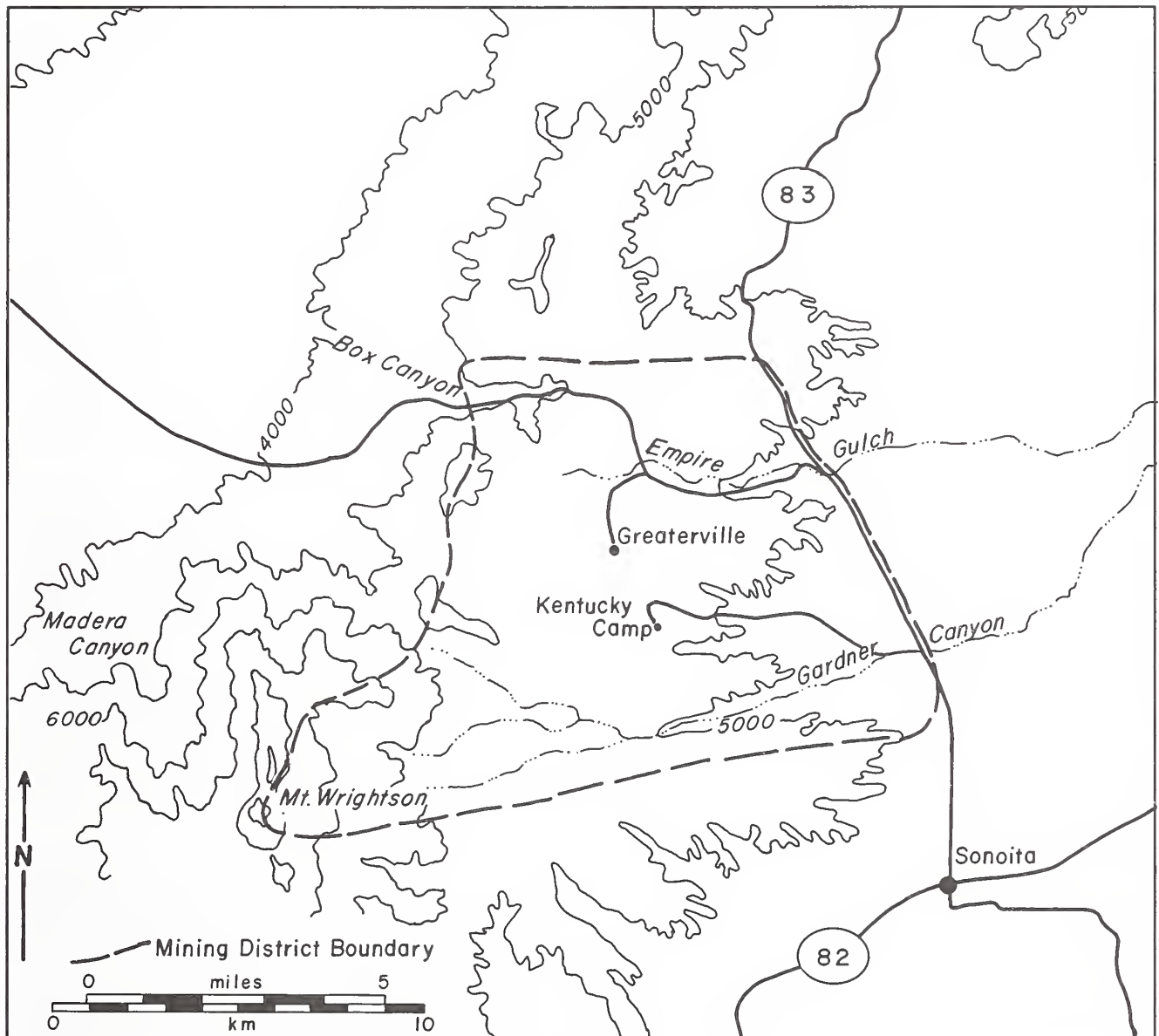


Figure 27. Map of the Greaterville Mining District and vicinity.

minerals. He has also provided a history of the Greaterville Mining District. At the risk of redundancy, we will summarize the history here in order to provide context while sparing readers the necessity of moving back and forth between pages of text.

Kentucky Camp is located in the Greaterville Mining District, which occupies the north-central part of the Santa Rita Mountains (Figure 27). The Greaterville District extends from Box Canyon south to Baldy Peak, also known as Mt. Wrightson. The crest of the Santa Ritas forms the western boundary of most of the Greaterville District, but the northwestern corner does extend west of the crest. To the east, drainages flow into Cienega Creek; to the west, they flow into the Santa Cruz River.

The Greaterville Mining District contained both lode and placer deposits. The lode deposits were discovered and prospected in the 1870s and there was some gold and silver production from lode mines from 1874 on (Keith 1974:26). However, the history of the Greaterville District is essentially one of placer mining. Most of the placer production occurred prior to 1886, although from 150 to 250 ounces of gold per year were reported until 1923. Since that time, output has been sporadic with some increase during the Depression and no output from 1961 to 1972 (Keith 1974:26).

The total estimated production through 1972 was 2,000 tons of lode ore containing 390 ounces of gold, 13,000 ounces of silver, 170 tons of lead, 20 tons of copper and 16 tons of zinc. Placer production is estimated at 29,000 ounces of gold and 6,000 ounces of silver. Total value of the production is estimated at \$650,000, with most occurring prior to 1900 (Keith 1974:27).

Gold-bearing gravels occupy an area of about eight square miles within the Greaterville District. They were first discovered in 1874, and a rush developed the following summer (Schrader 1915:153 and 158). Spread over a distance of about 1.5 miles, the placer gold occurred in a series of dry gulches: Boston, Kentucky, Harshaw, Sucker, Graham, Louisiana, Hughes, Ophir, Los Pozos, Colorado, Chispa and Empire. A series of placer camps sprang up and the Greaterville District ultimately proved to be the richest placer ground in southern Arizona (Schrader 1915:158).

However, the most important word in the preceding description was "dry." While the *Arizona Weekly Citizen* (1875a) reported permanent water on Greater, Sucker and Mack's gulches, miners were nevertheless

reported packing dirt from other localities to the water. In truth, the nearest reliable water source was Gardner Canyon, four miles to the south. Miners had to work the placer deposits by packing water to the gravels, or vice versa, in canvas or goatskin bags loaded on burros (Schrader 1915:158).

By November 1, 1875, the effects of seasonal variation in precipitation were becoming evident. Water was reported as becoming scarce and the "permanent" water on Greater Creek had been reduced to the point that "there is scarcely more than enough for drinking purposes" (*Arizona Weekly Citizen* 1875b). Dirt had to be packed 3/4 mile in some cases. Much of the packing was done by Mexican laborers, at a cost to the miner of about three cents per gallon (Schrader 1915:158-159).

This did not reduce interest in the placers, however, as a sufficient quantity of nuggets continued to be found, and the output for each miner was reported to be ten dollars a day (Schrader 1915: 159). The Greaterville District had a population of between 200 and 475 (Schrader 1915:158; *Arizona Weekly Citizen* 1876). Notwithstanding the difficulties, the estimated gold production by 1876 was \$60,000 to \$80,000.

The value of the gold produced can be disputed, given that production figures were frequently optimistic (to be charitable), in the hopes of promoting investment, and miners often did not dispose of placer gold in ways that could be readily tracked. In any case, by 1881 the richer gravels had been worked and the Greaterville District had begun to decline, although work continued on both placer and lode mines (*Arizona Weekly Citizen* 1881). By 1886 the District was considered worked out, and was practically dead (Schrader 1915:159).

"Dead" is always a relative term in gold districts, as they have a history of revivals spurred by developments in technology or the economy. In the case of the Greaterville District and Kentucky Camp, developments in both realms led to renewed mining shortly after 1900.

By 1900, hydraulic mining had become well-established in the placer fields of the West, especially in California. In this technique the ground is excavated by means of high-pressure streams of water and the gold-bearing gravels run into a sluice where the gold was extracted by gravity or amalgamation. Hydraulic mining could quickly reach deeply-buried deposits, or move large quantities of gravel to create economies of scale in working low-value deposits (Paul 1963:28-30).

The development of hydraulic mines required significant investments of capital, because elaborate water supply systems had to be constructed. By 1900 economic conditions were right for such investments to be made in the Greaterville District. The nation was in the grip of a depression, with falling commodity prices and a collapse in the silver market. Gold prices were fixed, however, and in theory an investor could move money into gold and expect it to hold its value (Coggin 1987:179).

One such investor was George B. McAneny. In September, 1902, he and four other individuals incorporated the Santa Rita Water and Mining Company to begin hydraulic mining in the Greaterville District. The irony of employing such a water-intensive technology in an arid region will be lost on few, and it is not clear what attracted McAneny to the Greaterville District. In 1900, the "Stetson Company" was reported to have been at work in Kentucky Gulch, but shut down after a few months (Schrader 1915:159). When the Santa Rita Water and Mining Company was incorporated, McAneny was the President and James B. Stetson was the Manager. Stetson, a mining engineer with California experience, may have convinced McAneny to undertake mining in the District. It is also possible that the Stetson and Santa Rita Companies were one and the same, with the "Stetson Company" an invention of later authors unfamiliar with the details of the mining. The work of the Stetson Company may be reflected in the stream channel workings recorded as site AR 03-05-02-503.

The Santa Rita Water and Mining Company began work almost immediately, as on January 17 of 1903 the *Arizona Daily Star* reported that Stetson had 40 men employed in the construction of a ditch six feet wide and five miles in length. Three miles of 24-inch pipe was also being installed, and a reservoir of "several million gallon capacity" was planned. The paper estimated that \$200,000 would be expended before mining began.

Wilson's observations (this volume) on the importance of transportation are borne out by a report from later that year that operations had been slowed by delays in arrival of machinery and pipes (*Arizona Daily Star* 1903b). But that was not the only difficulty encountered by the Santa Rita Water and Mining Company, as later that year the *Star* reported that work had been stopped by litigation. Unfortunately, the paper was not specific as to the nature of the case. One might speculate that a claim dispute was in progress, as the paper reported on October 1, 1903 that B. Barcelo had

25 men working on claims adjoining those of the Santa Rita Water and Mining Company.

The Santa Rita operation was again underway by June of 1904, when the *Arizona Daily Star* (1904a) reported that the Company had 70 men engaged in constructing buildings, pipelines, tanks and ditches. The buildings are undoubtedly those at Kentucky Camp. The men were living in much less substantial quarters, probably represented by sites AR 03-05-02-501 and -502. The pipelines and ditches are included in the water system, site AR 03-05-02-428. The Company was also reported to have spent considerable time acquiring claims in the vicinity of its operations, perhaps giving a clue to the nature of the earlier litigation. The *Star* was optimistic: "When they have their extensive reservoirs and hydraulic works completed Old Camp Greaterville will see greater prosperity than in its first boom days..." By July, the Company had constructed a large dam, which was reported by the *Star* (1904c) as "completely filled by the recent rain," and which was estimated to hold sufficient water to supply the placers for eight to ten months. The dam is another feature of the water system.

A conflicting report appeared in a *Star* issue dated August 15, 1904. The paper stated that the Company had over 1,000 acres patented, and controlled over 2,000 additional acres of claims. Considerable effort had been expended in laying pipe and building sluices, and they would have the dam completed, "but during the last year there has been scarcely enough water coming down the canyon to furnish sufficient quantity for making cement." That, in itself, might have given the Company pause.

But by August 24, the *Star* reported the system as having sufficient water to wash over 1,500 cubic yards of gravel every 24 hours. Test runs had begun, and the Company was described as employing three shifts and three nozzles (often known as "monitors" or "giants") capable of throwing the water 100 feet and "tearing up the ground with splendid results." These "splendid results" are represented by site AR 03-05-02-500. Nevertheless, it was estimated that completion of the dam would take another eight months. By this statement, the *Star* may have intended to refer to a larger dam in Gardner Canyon (AR 03-05-02-486).

Placering by the Santa Rita Water and Mining Company continued into December of 1904 (*Arizona Daily Star* 1904f). Little was heard of the operation until May 21, 1905, when the *Star* reported that manager Stetson had been killed the previous day in a fall from a third-

floor window of the Santa Rita Hotel in Tucson. Stetson had been consulting with the company's attorney and was scheduled to meet with McAneny and G. R. Comings, another investor. The cause of the fall was never definitively established. It was reported that he had been ill and gone to his room. He was subsequently seen sitting in the window, and then fell. The *Star* reported speculation that he had fallen asleep at the window.

At this point, the financial situation of the Company deteriorated. McAneny had spent between \$125,000 and \$175,000 on the developments and was continuing to spend about \$1,000 per month. By January of 1906, he had received only \$3,000 from these investments. Holder of a promissory note and a mortgage from the company, he foreclosed in an apparent effort to become sole owner. At the same time, his wife was filing for divorce, and a series of injunctions and restraining orders related to the alimony settlement restricted his ability to put additional money into the mining (State of California, County of Santa Clara, Superior Court Case 15971).

This effectively ended mining at Kentucky Camp. McAneny was able to purchase the property at the foreclosure sale, but was unable to continue development (State of California, County of Santa Clara, Superior Court Case 15971). In 1907, when he was about 72, his sister Elizabeth petitioned for guardianship, arguing that as a result of his unhappy marriage, divorce and financial condition, McAneny had become incompetent to manage his property. The petition was denied in California (McAneny's residence), but granted in Arizona. Eight months later (January 3, 1908) two other sisters, Harriet and Frances, again petitioned the court to appoint a guardian. George appears not to have answered the petition and T. C. Barnett was appointed guardian in California.

Eventually Barnett resigned and Elizabeth became guardian in both states. McAneny died in August, 1909, and Elizabeth became administrator of his estate. When she died, her interests were willed to her nephew, whose attorney, Louis G. Hummel, eventually acquired Kentucky Camp in 1911 (State of California, County of California, Superior Court Case Nos. unspecified).

Hummel turned the property into a cattle ranch. For a time, his daughter Floss Fenter and her husband lived at Kentucky Camp. About 1965 she sold the ranch to ANAMAX Mining, which exchanged Kentucky Camp and about 3,300 surrounding acres to the Forest Ser-

vice in 1989. Upon assuming title, the Coronado National Forest recognized the potential historic importance of Kentucky Camp. As part of planning for the parcel acquired from ANAMAX, the Forest provided for stabilization, restoration and interpretation of the property (Coronado National Forest 1991).

Stabilization, restoration and interpretation return us to the issue raised in the Introduction: public fascination with the history of mining in the American West. It is a special case of the interest in the past described by John Fritz (1973). Speaking of archeology, Fritz (1973:76) spoke of it as an intermediary between the worldly and the other-worldly, between the quick and the dead. Archeological data satisfy a need to know, experience, control and be reassured about an "other world" of shadowy figures and events. This is no less true of history, where these figures and events have more directly influenced the present. Creating order out of the past, and making sense of the present, is an important goal of interpretation at Kentucky Camp.

How is this to be achieved? Simply put, Kentucky Camp can be viewed as a microcosm of Western mining history, illustrating the key trends described by Rodman Wilson Paul (1977):

1. A transition from simple extraction technologies applied to high-grade deposits (e.g. panning) to complex technologies applied to refractory or low-grade deposits (e.g. smelting, leaching and electrolytic processes).
2. A transition from early emphasis on precious metal mining, to modern emphasis on base metals.
3. A transition from limited capital investment to massive investment by large corporations, often multi-national in scope.

Hydraulic mining, as represented by Kentucky Camp, reflects characteristics of each end of this spectrum, creating an opportunity to make a clear and direct linkage between history and contemporary social issues.

The earliest era of mining in the American West, with its emphasis on rich superficial gold placers, was based on the least demanding sources of ore, which were extracted by simple technologies. The most dramatic manifestation of this era was the California Gold Rush (Paul 1963:12-28), but it is also illustrated by the early history of Greaterville, when miners were able to wash gravels in rockers and sluices, using water and gravity to separate the gold. Although

similar techniques are popular among modern day prospectors and recreational miners, few people today earn their living through such simple methods.

The exhaustion of the rich and accessible deposits initially led to the decline of the Greaterville District. In California, collapse was usually followed by the large-scale entry of Chinese into the mines, as they would work for the lower returns provided by the more diffuse deposits that remained. At Greaterville, laborers from Mexico assumed this role. Schrader (1915:158) noted that by 1878 (as the placers were being worked out), the population of the camp consisted of "76 Americans ... and ... also a population of about 400 Mexicans." The 1880 census showed approximately 35 Caucasian and 85 Mexican inhabitants of the Greaterville District.

The next phase of mining was dependent on the development of cooperative — usually corporate — efforts to reach more deeply buried deposits, or move larger quantities of material to make a living on volume. In California, this led to one of the most notable innovations of Western mining, hydraulic mining (Paul 1963:28-30. It is this phase which is most directly represented by Kentucky Camp and its water system.

While still employing only water and gravity, hydraulic mining at Kentucky Camp demonstrates considerably more technological sophistication than earlier efforts. In contrast to earlier placer mines, the system was conceived and built as an integrated unit, from the stream diversions to the distribution valves. It had to be — the gentle gradients of the water systems that supplied hydraulic mines (averaging 0.25 percent in the case of Kentucky Camp) leave little room for error in design or construction, especially with hand labor. If gradients are too low, the ditches silt in. If too steep, the ditches wash out.

The success of the system, evidenced by contemporary reports of successful test runs, shows that Stetson was a competent engineer, thereby illustrating the importance of such persons to this phase of mining, as more sophisticated technology required more capable managers.

And yet, Kentucky Camp was not at the forefront of early twentieth-century mining in Arizona, or elsewhere in the West. By that time, precious-metal mining was focusing on the extraction of gold from deposits in the western part of the state, using the newly-developed cyanide process. More important, the price of copper was increasing, and by the early twentieth century, base metals dominated the mining industry to the extent that most gold and silver were

produced as by-products of the refining of copper (Keane and Rogge 1992:45-54). Throughout the West, elaborate stock promotions and extensive scientific and practical studies resulted in the development of smelting technologies that could handle more complex ores (Paul 1963:176-196; 1977:738-739).

Furthermore, regardless of the sophistication of the technology or the ability of the engineer, the Santa Rita Water and Mining Company operations never did extract significant quantities of gold from the gravels of Boston Gulch. While no production records have come to light, the amounts which McAneny received from the mining, and the ultimate abandonment of the operation, speak for themselves. Recreational prospectors do continue to find some gold, and enjoyment, in the gravels of the old Greaterville Mining District, but there has been no significant industrial production since the 1880s. This scenario was repeated throughout the West, as high-grade mineral deposits were depleted, and the new technological developments made it possible to extract and process large quantities of low-grade ore and profit by economies of scale (Paul 1977:738-739).

The increasingly corporate nature of mining is evidenced by contemporary accounts of up to 70 laborers employed in the construction of the Kentucky Camp water system. McAneny's expenditure of \$125,000 to \$175,000 shows the importance of investors in providing the capital needed to acquire the increasingly sophisticated technology, and in sustaining operations until a paying mine could be developed.

That the rise of corporate, industrial mining also involved increasing differentiation between the lives of the average miner, the professional manager and the investor is demonstrated by the contrast between the buildings at Kentucky Camp and the remains of workers' camps at Fish Canyon and Boston Gulch. Although constructed of adobe, the Kentucky Camp buildings, occupied by Stetson and presumably by other managerial personnel, show little connection with the vernacular Arizona territorial adobe of the 1880s. The availability of milled lumber, shingles and pre-hung doors and windows reflect the availability of capital and improved transportation. They create a character quite different from that of the log roof framing, flat earth roofs, dirt floors and unglazed windows of the traditional Arizona adobe.

In sum, Kentucky Camp represents a period of gold and silver mining in Arizona in which small investors used the fixed value of gold to protect themselves against an economic depression, but in which the

mining industry as a whole was dominated by the production of copper and other base metals. It illustrates the importance of capital to these ventures, as well as the importance of professional engineering and design.

Finally, the story of Kentucky Camp contains elements that are personal and unique. The death of James B. Stetson, and the personal and financial problems of McAneny, were not unusual circumstances in themselves. However, they are particular historical facts that had an influence on Kentucky Camp independent of trends in the mining industry. It was, after all, not the development of large scale base metal mining that brought an end to mining at Kentucky Camp. It was the loss of their engineering and financial support, combined with another particular geological fact—the gold was not there.

STABILIZATION

Research has provided insight into the significance of Kentucky Camp. Through on-going stabilization projects, the Coronado is striving to preserve this unique resource. After acquiring Kentucky Camp, the Coronado National Forest commissioned an analysis of building conditions (Ryden 1990). The analysis identified structural problems and classified them as critical, serious or minor. It recommended correction of these problems in stages characterized as stabilization, preservation and rehabilitation.

Critical problems resulted from deterioration of roofs, salvage of roof structural members and drainage deficiencies. Kentucky Camp buildings all possess wood shingle roofs. Weathering of the shingles permitted water to erode the tops of interior and exterior walls, resulting in the collapse of walls over interior lintels in the hotel, and threatening the stability of exterior corners.

Deterioration accelerated when salvagers, believing the site to be abandoned, began removing materials. Salvage of roof structural members, especially joists from the cabins, combined with basal coving of exterior walls as a result of rainsplash, caused walls in Cabin C to settle outward, also threatening collapse. Removal of a downspout along the north wall of the hotel, in combination with the deterioration of the roof, resulted in the collapse of a section of wall.

Cabin A was built into the slope to the north and seepage of ground water through the wall and into the cabin caused the north wall to fail.

The Forest moved swiftly to correct these problems. In the spring of 1991, Passport in Time volunteers began recording Kentucky Camp proper to document its pre-stabilization condition. That summer, Coronado National Forest work crews replaced the roofs on the four standing buildings, reconstructed the collapsed hotel wall and replaced ceiling joists in the cabins. Trenches were dug to intercept surface runoff eroding cabin A and the barn.

Materials for the repairs were acquired as a result of a partnership agreement with the production company filming the “Young Riders” television series. Producers considered repairing the buildings and using them as a set. This raised concerns that repairs and modifications would be incompatible with the historic character of the site. Instead, the production company constructed its set elsewhere. However, the special use permit fees were deposited in an account dedicated to the stabilization of Kentucky Camp. By this means, approximately \$25,000 was raised for materials and supplies used in stabilization.

In 1992, Forest employees volunteered to manufacture adobe blocks (Figure 28) needed for additional wall repairs, and to begin the process of re-pointing and patching foundations and walls. The process was continued when the Southwestern Region selected Kentucky Camp as the site for its 1992 stabilization training session. Archeologists from throughout the Region received training in the stabilization of adobe buildings, under the direction of Harrison Goodall of Conservation Services and David Yubeta of Tumacacori National Monument.

In a second partnership agreement, with the production company filming the movie “Posse”, the Forest secured funding to bury the electrical lines leading to the well at Kentucky Camp, upgrade the well and enclose it in a compatible adobe shed, install a septic system, and build a pad for a host/caretaker trailer. A third partnership was also initiated in 1993. Friends of Kentucky Camp, a private, non-profit corporation, was formed to provide on-going support for work at the site.

Subsequent Passport in Time projects continued the recording, patching and re-pointing of the adobe walls. Tongue-and groove ceilings in the hotel were repaired and re-usable architectural elements (doors, etc.) were salvaged from the debris present in and around the buildings. Passport volunteers also surveyed and recorded the water system and other sites in the Kentucky Camp Historic District. In 1994, the slope behind cabin A was excavated and a retaining wall



Figure 28. Kentucky Camp workday in 1992 -- Forest employees making adobe blocks. Photo by Jim McDonald.

constructed in order to eliminate problems with ground water seepage.

At this time most, but not all, of the critical structural problems have been corrected. The most significant remaining problems are cattle entering the buildings, the water damage in cabin A, and continued settling of walls in cabin C and the barn. The first will be eliminated in the near future through fence construction sponsored by the Forest and Friends of Kentucky Camp; work to fix the other problems remains to be scheduled.

However, the end of the stabilization phase envisioned by Ryden (1990) is near. Attention must now turn to the preservation and rehabilitation phases. While the stabilization phase consists of work to halt further deterioration of the buildings, preservation and rehabilitation would return the property to a condition in which it can be used. This requires that a use be identified.

INTERPRETATION

The long-term use of Kentucky Camp is interpretation of the history of mining in the Greaterville area (Coronado National Forest 1991). An Interpretive Plan (Nogales Ranger District 1993) cites two primary reasons for interpreting Kentucky Camp:

Visiting historic sites is one of the most popular leisure activities in the United States ... Interpreting Kentucky Camp will provide a recreation opportunity unique in southern Arizona and help meet part of the Coronado National Forest's mission statement: to provide for balanced contributions to social needs of the people of Southeast Arizona and Southwest New Mexico. In a time of rapid technological and social change, history is invaluable in providing a sense that the change is directional, not accidental; hence, the public fascination

with historical sites and interpretation and the satisfaction of a social need.

National Forest sites, particularly remote ones with relatively little visitation and almost no regular patrolling by Forest Service personnel, are subject to abuse ... Interpretation will satisfy the leisure-time desires of visitors and aid in the physical management of the site by encouraging in visitors a sense of appreciation and stewardship for the special resources there (Nogales Ranger District 1993:1).

The Interpretive Plan focuses on Kentucky Camp proper, recognizing that opportunities will arise to include interpretation of other features of the Historic District in future recreation projects (Nogales Ranger District 1993:4). In fact, this is already occurring, as a draft enhancement plan for the Nogales Ranger District segment of the Arizona Trail provides for interpretation of the water system (Makansi and Gillespie 1994).

Three goals for interpretation have been identified:

1. To stimulate visitors' curiosity about the evolution of Arizona's mining industry from the perspective of the mining ventures at Kentucky Camp (Nogales Ranger District 1993:7).

This goal develops the themes identified through research. Kentucky Camp exemplifies the changing economics, scale and technologies of mining in Arizona as a result of the depletion of rich, concentrated mineral deposits. The focus is on presentation and comparison of the early placer tailings in the Historic District (site AR 03-05-02-504) with the later buildings, water system and hydraulic pits. The former required little more than a "grubstake" and persistence to develop. The latter required almost 200,000 early twentieth-century dollars. For examples of the latest and most developed phase of mining, visitors could be directed to the large open-pit mines west of the Santa Ritas, near Green Valley, representing investments of hundreds of millions of dollars.

These phases represent an historical trajectory, which should suggest where the future of Western mining lies. Initially, one can expect the continued development of large, industrial operations focusing on low-grade deposits. However, the trend toward the exploitation of ever more complex ores and ever more diffuse deposits should underscore the ultimate need to use the highest-grade metal resources available —

by reuse and recycling of metals which have already been mined and processed.

2. To stimulate visitors' interest in the legacy of Arizona's mining industry: the ranches, farms, towns, and transportation systems that remained when the miners departed (Nogales Ranger District 1993:9).

Ultimately, Kentucky Camp was a failure as a mining venture. Such was the fate of the vast majority of such attempts. But it was not a complete failure. When Louis Hummel acquired the property and turned it into a ranch, he represented a common pattern. Profitable mines would support the existence of nearby farms, ranches and towns, and even unprofitable mines could be the seed for future economic development. In this case, Hummel's acquisition of a failed mining venture turned an attorney and his family into ranchers, whose descendants remain in the area today. They became participants in a segment of the economy that, along with mining, has been a more stable basis for southern Arizona's growth. However, this should be a secondary aspect of the interpretation at Kentucky Camp, as elements attributable to ranching are a relatively minor component of the surviving features.

3. To cultivate in visitors a sense of appreciation for the cultural and natural resources of the Kentucky Camp area and the Coronado National Forest and to encourage stewardship of those resources.

This interpretive goal has several components. First, preservation and rehabilitation activities at Kentucky Camp (e.g. Passport in Time projects) provide opportunities for the public to become directly involved in the conservation of valuable resources and thereby develop a sense of personal accomplishment. Second, whether or not directly involved in preservation and rehabilitation, individuals become more aware and informed about heritage resources and their relationship to issues affecting their lives. One such issue (resource depletion) was mentioned above. Another issue relevant to Kentucky Camp is the applicability of the General Mining Law in its original and modern contexts: the law responded to conditions prevalent during the earliest phase Western mining, characterized by small ventures supported by limited capital and technology; its relevance to contemporary mining is a matter of on-going debate. Finally, interpretation at Kentucky Camp creates an opportunity to increase public understanding of the role of the Forest Service in the preservation of Arizona's heritage.

To achieve these goals, interpretation at Kentucky Camp will focus on the 1902 to 1906 mining era as represented by the existing buildings and water system (Nogales Ranger District 1993:10). The Interpretive Plan calls for most of the buildings to be restored, going beyond Ryden's (1990) concept of rehabilitation. Cabin A is a potential exception, and would be left in a stabilized condition to give visitors a sense of the pre-restoration "ghost-town" feeling of the site. Interpretive media would include living history programs, tours, signs, brochures and audio tapes. Development of interpretive media has begun, with the preparation of a description of the camp (Coronado National Forest 1991).

The hotel would be the interpretive centerpiece of Kentucky Camp and would likely be the first building restored. It would include furnishings appropriate to the mining era, with a focus on daily life in the camp. Since it also shows evidence of use as an office, the design, construction and operation of the water system could also be interpreted there. The assay office would also be restored, and would provide the most appropriate location for interpretation of the mining and assay methods. Cabin C would be restored to interpret the lifestyle of managerial personnel such as Stetson.

Access would be via a half-mile long pedestrian trail from Forest Road 163 south of the site. This trail is already in existence, and is incorporated in the Arizona Trail. A trailhead will be constructed, and interpretive signs placed along the trail. However, modern interpretation would stop short of the camp, in order to preserve as much isolation from contemporary influences as possible, and enhance the effectiveness of living history presentations. Interpreters would assume the roles of personages such as early prospectors, or mining engineers such as Stetson, meeting with visitors while re-enacting life at the camp.

The Interpretive Plan (Nogales Ranger District 1993: 11) also calls for construction of an interpretive trail along the water system. Implementation of this recommendation has begun. Segments of the water system are incorporated in the Arizona Trail and interpretive signs were installed in 1995.

THE FUTURE OF KENTUCKY CAMP

While a substantial commitment has been made to Kentucky Camp, with stabilization and interpretation plans in place and in the process of implementation, there is much more to be done. There is much yet to be learned about Kentucky Camp, critical stabilization needs remain, and the majority of actions specified in

the Interpretive Plan need to be implemented. Highest priority actions include:

Research

1. Conduct further research in Arizona and California to learn more about the corporate activities of McAneny, Stetson and their various companies. This is essential to developing the theme of the importance of corporate organization to successful hydraulic mining.
2. Conduct genealogical research to identify descendants of McAneny and Stetson, who may have historical information on the mining. This is necessary to develop the theme of the importance of capitalists and engineering professionals in the evolution of Western mining.
3. Conduct additional research in state, county and historical society records to determine the names of Kentucky Camp laborers, and determine if there are descendants who could provide historical information on the property. This is necessary to balance the perspective provided by research on McAneny and Stetson.
4. Expand research to include earlier and later phases of mining within the Greaterville district, to provide a richer context on the historical trajectory of mining activities.

Stabilization

1. Improve ties between the roof joists and walls in cabin C. Buttress walls if necessary.
2. Patch or rebuild north wall of cabin A.
3. Exclude cattle from the immediate area of Kentucky Camp proper.

Interpretation

1. Update and expand the existing brochure.
2. Install temporary interpretive signs within Kentucky Camp proper, pending future restoration and development of living history programs.

Many other needs have been identified for the long term. But none present insuperable difficulties. With persistence in meeting such needs, Kentucky Camp will become a place where visitors will be transported

in time to the early twentieth century. There, they will become aware of the challenges faced by one small group of miners and investors. As they become aware,

some of the mystery that once surrounded the era will disappear, to be replaced with a greater understanding both past and present.

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1880b January 14

1880c January 16

1880d February 1

1880e February 8

1880f October 25

1880g November 24

1903a January 17

1903b March 7

1903c September 13

1903d September 23

1903f December 4

1903e October 1

1904a June 5

1904b July 18

1904c July 28

1904d August 15

1904e August 24

1904f December 22

1905 May 21

1910a April 22

1910b June 18

1910c June 19

1910d June 26

1910e July 1

1910f July 30

1910g August 16

1910h August 26

1910i August 30

1910j October 2

1910k October 30

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